



## **The Dive Profiles and Manifestations of Decompression Sickness Cases After Air and Nitrogen-Oxygen Dives.**

**Volume: I**  
**Data Set Summaries, Manifestation Descriptions, and Key Files**

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**The experiments reported herein were conducted according to the principles set forth in the current edition of the "Guide for the Care and Use of Laboratory Animals," Institute of Laboratory Animal Resources, National Institutes of Health .**

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We would like to recognize and thank the many individuals and laboratories that contributed to this effort: Bonnie Davis from the Naval Experimental Diving Unit in Panama City, Florida; Ron Nishi and Dave Eaton from the Defense and Civil Institute for Environmental Medicine, Canada; and several investigators from various laboratories in the United Kingdom. We also thank Susan Mannix for editorial assistance.

## ***DEDICATION***

*To CAPT Otto Van der Aue, MC, USN, alpha Diving Medical Officer.*

## **INTRODUCTION**

To successfully develop decompression tables to prevent or minimize decompression sickness (DCS), a knowledge of the causal relationship between the dive profile and DCS is required. While applying survival analysis techniques to decompression table development, Weathersby et al. (1) depended on a large compilation of high quality dive profile and dive outcome data, but DCS was used merely as a binomial outcome (2-8). Decompression sickness was recorded as either present or absent without any qualitative measure or effort to describe the protean manifestations of DCS.

Despite the fact that the signs and symptoms of DCS were first documented more than 100 years ago and its clinical characteristics detailed in countless publications, there has been no comprehensive effort focused on determining the relationship between the dive profile and DCS manifestations. This report represents the first step toward such an effort. We have compiled the descriptions of hundreds of DCS cases that occurred after air or nitrogen-oxygen dives in research trials conducted by the United States, United Kingdom, and Canadian militaries from 1944 to 1997. Unique to this report we also include detailed descriptions of the dive profiles associated with these cases. We hope and expect that this comprehensive combination will allow analysis of the relationship between the dive profile and manifestations of DCS.

## **METHODS**

We compiled a list of known decompression trials in U.S., U.K. and Canadian military laboratories by using published summary reports (2, 4), searching peer-reviewed journals and technical publications, reviewing archived records at the Naval Medical Research Institute (NMRI) and Naval Experimental Diving Unit (NEDU, Panama City, FL) for the results of unpublished trials, and communicating directly with investigators when possible. We extracted

descriptions of cases verbatim from reports and, where available, the original logs and other records of the trials. This is not to suggest that there was always complete agreement on the DCS manifestation descriptions. If a discrepancy was encountered, all available information was included. One example of this is data set EDU1157 (Section I, M), where the descriptions from the technical report and log books are both included, but indicated separately. For trials that were not already included in the primary electronic database maintained at NMRI, the dive profiles were extracted from the same records. In some cases they were transcribed verbatim from the original dive log and translated into the NMRI database format. For inclusion in this report the records on both the DCS cases and their complete dive profiles had to be available.

Many of the trials in this report were thoroughly reviewed earlier by Weathersby et al. (2, 4) and are indicated as such on the cover sheet of the data set. Some of the other data sets included here were also previously reviewed by Weathersby, but were not included in the original database (4) because of concerns with data quality. The concerns ranged from degree of medical surveillance, through undocumented descent times, to uncertainties on depth standard (diver feet or diver chest). In some cases we were fortunate to find the information necessary to make these data sets credible and complete for inclusion here. For example, the complete dive profiles and manifestation descriptions, which were previously missing, were found in the archived dive logs maintained at NEDU. These early trials included many spectacular dive profiles that are truly inimitable and could never be considered for research diving today. To retrieve this valuable information, we included as many of these trials as possible, and were enormously gratified with the detailed manifestation descriptions that were found in the original dive logs. Throughout this report, however, you will see that the DCS descriptions are by no means uniform; some are intricate and verbose, while others are frustratingly brief.

Some aspects bearing on data quality are summarized in Table 1. Original diving logs were sometimes recovered to reconstruct pressure profiles, but logging detail varied substantially. A complete and automated profile record was preferable. (See Weathersby et al. (4) for some unplanned depth changes). Failing that, descent (increasing pressure) and ascent rates were taken from logs - or even assumed based on our idea of "standard" rates that might have applied in that place and time. Automatic recording of gas switches were quite rare. As discrepancies were identified, access to the original investigator proved invaluable. Table 1 is an imperfect summary of all the quality issues encountered, but may save some investigators the need to dig out all the original records again. In general, the presence of more "Y" entries indicates our greater confidence in the other material tabulated. Ultimate responsibility for future use of these data sets, as always, with the investigator using the data.

In his original effort, Weathersby developed a set of diagnostic criteria (Appendix A) to serve as a retrospective tool in determining what symptoms and signs were to be regarded as DCS. That review was not performed at that time. While we acknowledge that no set of criteria for diagnosing DCS is perfect, we elected to use these guidelines now because they provide a means of imposing some consistency over the 50 years of trials covered in this report. A panel consisting of 4-8 diving medical officers (DMOs) at NMRI met on an *ad hoc* basis throughout the compilation of this report, specifically for retrospective diagnosing. Trials that were analyzed in this way are indicated on the cover page for that data set with the names of panel participants and the dates of the review.

Table 1. Data Quality

			Profile Quality						Manifestation Description			
			Quality						Quality			
TYPE OF DIVES	DATA SET						all medical events available for review?	Medical Officer's notes used?	Signs & symptoms 1=poor 5=excellent	re-diagnosed by contemporary M.O. panel?		
	original log used? Y=yes N=no	full profile recorded automatically?	ascent rate measured (M) or assumed (A)?	descent rate measured (M) or assumed (A)?	gas switch time from measurement?	original investigator consulted?						
I. SINGLE AIR	A.	DC4D	Y	N	M	M	n/a	Y	N	N	3	N
	B.	EDU557	Y	N	A	A	n/a	N	N	N	3	Y
	C.	EDU885A	N	Y	M	M	n/a	Y	N	N	3	N
	D.	UPS290	N	N	A	M	n/a	N	N	N	2	N
	E.	DC4W	Y	N	M	M	n/a	Y	N	N	1.5	N
	F.	EDU1351NL	N	N	A	A	n/a	N	N	N	1	Y
	G.	EDU849LT2	Y	N	A	A	n/a	N	N	N	5	Y
	H.	NMR97NOD	Y	??	M	M	n/a	Y	Y	Y	5	N
	I.	EDU545	Y	N	M	M	n/a	N	N	N	5	Y
	J.	NMRNSW2	Y	Y	M	M	n/a	Y	Y	Y	4	N
	K.	PASA	Y	Y	M	M	n/a	Y	N	N	3	N
	L.	SUBX87	N	Y	M	M	n/a	Y	N	N	5	N
	M.	EDU1157	Y	N	M	M	n/a	N	N	N	3	Y
	II. SINGLE NON-AIR	A.	NMR8697	Y	Y	M	M	Y	Y	Y	Y	3
B.		EDU1180S	N	Y	M	M	N	Y	N	N	2	N
C.		EDU885M	N	Y	M	M	N	Y	N	N	2	N

		original log used?	full profile recorded automatically?	ascent rate measured (M) or assumed (A)?	descent rate measured (M) or assumed (A)?	gas switch time from measurement?	original investigator consulted?	all medical events available for review?	Medical Officer's notes used?	Signs & symptoms I=poor 5=excellent	re-diagnosed by contemporary M.O. panel?
III. REPETITIVE & MULTILEVEL (AIR)	A.	PAMLA	Y	M	M	n/a	Y	N	N	3	N
	B.	EDU885AR	N	M	M	n/a	Y	N	N	3	N
	C.	DC4DR	Y	M	M	n/a	Y	N	N	2	N
	D.	DC4WR	Y	M	M	n/a	Y	N	N	3	N
	E.	EDU657	Y	M	M	n/a	N	N	N	3	Y
	F.	PARA	Y	M	M	n/a	Y	N	N	3	N
IV. REPETITIVE & MULTILEVEL (NON-AIR)	A.	EDU184	N	M	M	N	Y	N	N	2	N
	B.	PAMLAOS	Y	M	M	??	Y	N	N	3	N
	C.	PAMLAOD	Y	M	M	??	Y	N	N	3	N
	D.	EDU1180R	N	M	M	N	Y	N	N	2	N
	E.	EDU885S	N	M	M	N	Y	N	N	3	N
V. AIR + O2 DECOMPRESSION	A.	NMR94EOD	Y	M	M	??	Y	Y	Y	5	Y
	B.	DC8AOD	Y	M	M	??	Y	N	N	2	N
	C.	DC8AOW	Y	M	M	??	Y	N	N	2.5	N
VI. SATURATION	A.	ASATARE	Y	M	M	Y	Y	N	Y	3	N
	B.	ASATNSM	Y	M	M	n/a	Y-N	N	N	1	N
	C.	ASATEDU	Y	M	M	Y	Y	N	Y	2	N

	original log used?	full profile recorded automatically?	ascent rate measured (M) or assumed (A)?	descent rate measured (M) or assumed (A)?	gas switch time from measurement?	original investigator consulted?	all medical events available for review?	Medical Officer's notes used?	Signs & symptoms 1=poor 5=excellent	re-diagnosed by contemporary M.O. panel?
	D. SUREX(M)	Y	M	M	M	n/a	N	N	1	N
	E. ASATNMR	Y	M	M	M	n/a	Y	Y	3	N
	F. NMR9209	Y	M	M	M	n/a	Y	Y	4	Y
	G. EDUAS45	Y	A	A	A	N	N	N	4	Y
	H. ASATDC	Y	M	M	M	n/a	N	N	4	N
	I. ASATFR85	N	A	A	A	n/a	N	n/a	n/a	n/a
VII. SUB-SAT	A. EDU849S2	Y	A	A	A	n/a	N	N	5	Y
	B. NSM6HR	Y	M	M	M	n/a	Y	N	4	N
	C. RNPLX50	N	A	A	A	n/a	N	N	1	N
VIII. SUR-D (Air)	A. EDU545SUR	Y	M	M	M	n/a	N	N	5	Y
	B. NMRASUR90	Y	M	M	M	n/a		n/a	n/a	n/a
IX. SUR-D (O2)	A. EDU1351SD	N	A	A	A	N	N	N	1	Y
	B. DC8ASUR(W)	Y	M	M	M	N	Y	N	3	N
	C. DCSUREP(W)	Y	M	M	M	N	Y	N	3	N
	D. NMROSUR90	Y	M	M	M	N		Y	4	N

Y = Available and used

N = Not

N/A = Not applicable

? = unknown

Categorization of cases as DCS, marginal DCS, or not DCS was done by consensus and if consensus could not be reached, by simple majority. Marginal cases ("A-2" in Appendix A), involve symptoms or signs that are thought to be decompression related, but not serious enough to require recompression therapy (6). No attempt was made to further classify cases by manifestation. Most importantly, the entire available manifestation description of each DCS case and marginal event is included here so an investigator may make his or her own judgement as to the "correct" diagnosis and categorization of the manifestations.

For most of these trials we did not have information on all medical events that occurred on all dives in the trial; some notable exceptions are NMR97NOD, NMR8697, NMR9209, NMROSUR90 and NMR94EOD, although we only include descriptions of events diagnosed as DCS or marginal DCS in this report. For all other trials we had information only on those events that were considered decompression related by the original investigators. When the DMO panel was convened to review cases, a blinding of dive profiles, original diagnoses, and treatment outcomes was not done. In most cases, changes in diagnosis from the original were made in favor of DCS. Original diagnoses are included in the descriptions. If a diagnosis was changed from DCS to a lesser diagnosis, that case description was included (as well in this report) so an investigator may make his or her own judgement.

## **RESULTS**

This report summarizes 434 cases of DCS and 464 marginal cases after 8578 dives using air and other nitrogen-oxygen mixtures represented in 48 data sets from trials conducted between 1944 and 1997 (Table 2). It is divided by nine trial types (single air, surface decompression with



oxygen, etc.), then by actual trial represented by its NMRI data set name. Each data set is presented in five parts:

1. A cover sheet briefly summarizing the trial that also provides germane references
2. The manifestation descriptions
3. The complete dive profile for all DCS events
4. Graphic representation of each dive with a DCS event
5. Key File from the NMRI data base provides a one line summary per profile of every profile, even those that did not result in a DCS event. A profile here is defined by a unique depth-gas-time-outcome combination, generally representing a single human exposure. Multiple replicate uneventful dives of several people could also be combined as a single "profile" (4). The column headings are, for the most part, self-explanatory.

In the "Outcome" column: 0.0 = no DCS    1.0 = DCS    0.5 = Marginal DCS

Depth is represented in feet of seawater (fsw).

Bottom time, Ascent time, and  $T_1$  &  $T_2$  times are indicated in minutes.

The values in the "Ascent Time" column are more or less useful, depending on the dive type (i.e., they are essentially of no use in the repetitive and multilevel dives). The only information excluded here from the original profile are diver names and/or initials in the "Data Set Notations" column.

The Profile Number (shown in the first column of the manifestation description table) can be used to identify the same dive in Parts 3, 4, and 5. As in Report VII, onset times are represented using  $T_1$  and  $T_2$  and follow the same rules as described there (4). In short, Time  $T_1$  is the last time a diver was definitely known to be symptom-free, while  $T_2$  is the earliest time DCS was definitely present. Thus, the  $T_1$ - $T_2$  interval serves to bound the actual onset time of symptoms. It is important to note, however, that the T-times in part 2 and the T-times in part 5 use different starting points, so they appear different even though they are the same. In the manifestations descriptions table (part 2) the T-times are calculated from the end of the dive, that is, using the reach-surface time. In the Key File (part 5), the T-times are calculated from the start of the dive, that is, the leave surface time. The individual data sets follow.

**Table 2. Summary of Data Sets**

TYPE OF DIVES		DATA SET	# Dives	DCS	Marginals
<b>I. SINGLE AIR</b>	<b>A.</b>	DC4D	797	19	4
	<b>B.</b>	EDU557	568	27	0
	<b>C.</b>	EDU885A	483	30	0
	<b>D.</b>	UPS290	299	4	0
	<b>E.</b>	DC4W	244	8	4
	<b>F.</b>	EDU1351NL	143	2	7
	<b>G.</b>	EDU849LT2	141	26	38
	<b>H.</b>	NMR97NOD	103	3	4
	<b>I.</b>	EDU545	94	18	7
	<b>J.</b>	NMRNSW2	91	5	5
	<b>K.</b>	PASA	72	5	2
	<b>L.</b>	SUBX87	58	2	0
	<b>M.</b>	EDU1157	46	15	6
		<b>Totals</b>	<b>3139</b>	<b>164</b>	<b>77</b>
<b>II. SINGLE NON-AIR</b>	<b>A.</b>	NMR8697	477	11	18
	<b>B.</b>	EDU1180S	120	10	0
	<b>C.</b>	EDU885M	81	4	0
		<b>Totals</b>	<b>678</b>	<b>25</b>	<b>18</b>
<b>III. REPETITIVE &amp; MULTILEVEL (AIR)</b>	<b>A.</b>	PAMLA	236	13	12
	<b>B.</b>	EDU885AR	182	11	0
	<b>C.</b>	DC4DR	142	1	0
	<b>D.</b>	EDU657	142	4	0
	<b>E.</b>	PARA	135	7	3
	<b>F.</b>	DC4WR	12	3	0
		<b>Totals</b>	<b>849</b>	<b>39</b>	<b>15</b>
<b>IV. REPETITIVE &amp; MULTILEVEL (NON-AIR)</b>	<b>A.</b>	EDU184	239	11	0
	<b>B.</b>	PAMLAOS	140	5	3
	<b>C.</b>	PAMLAOD	134	6	0
	<b>D.</b>	EDU1180R	128	2	0
	<b>E.</b>	EDU885S	94	4	0
		<b>Totals</b>	<b>735</b>	<b>28</b>	<b>3</b>
<b>V. AIR + O<sub>2</sub> DECOMPRESSION</b>	<b>A.</b>	NMR94EOD	284	17	9
	<b>B.</b>	DC8AOD	256	3	2
	<b>C.</b>	DC8AOW	46	3	1
		<b>Totals</b>	<b>586</b>	<b>23</b>	<b>12</b>

<b>VI. SATURATION</b>	<b>A.</b>	ASATARE	165	20	13
	<b>B.</b>	ASATNSM	132	18	21
	<b>C.</b>	ASATEDU	120	13	27
	<b>D.</b>	SUREX(M)	64	5	3
	<b>E.</b>	ASATNMR	50	1	0
	<b>F.</b>	NMR9209	48	2	5
	<b>G.</b>	EDUAS45	26	8	4
	<b>H.</b>	ASATDC	23	8	1
	<b>I.</b>	ASATFR85	21	0	0
		<b>Totals</b>	<b>649</b>	<b>75</b>	<b>74</b>
<b>VII. SUB-SAT</b>	<b>A.</b>	EDU849S2	60	13	17
	<b>B.</b>	NSM6HR	57	3	2
	<b>C.</b>	RNPLX50	57	5	0
		<b>Totals</b>	<b>174</b>	<b>21</b>	<b>19</b>
<b>VIII. SUR-D (Air)</b>	<b>A.</b>	EDU545SUR	197	27	12
	<b>B.</b>	NMRASUR90	64	0	0
		<b>Totals</b>	<b>261</b>	<b>27</b>	<b>12</b>
<b>IX. SUR-D (O<sub>2</sub>)</b>	<b>A.</b>	EDU1351SD	1035	20	233
	<b>B.</b>	DC8ASUR(W)	358	10	1
	<b>C.</b>	DCSUREP(W)	69	1	0
	<b>D.</b>	NMROSUR90	45	1	0
		<b>Totals</b>	<b>1507</b>	<b>32</b>	<b>234</b>
<b>TOTALS</b>			<b>8578</b>	<b>434</b>	<b>464</b>

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## **APPENDIX A.      Diagnosis Criteria: from REVISION 22 NOV 1988, Weathersby, et al.**

First step: Separate outcome into 3 categories:

- Cat A.**    Definite DCS (Symptom within 24 hour unless Sat dive)
- Cat B.**    Unknown Outcome
- Cat C.**    Not DCS

Second Step: Separate Cat A further:

- Cat A-1**   Definite DCS.Requiring recompression therapy by 1988 standards
- Cat A-2**   Definite DCS.NOT requiring recompression by 1988 standards. Difference between A-1 and A-2 is 1988 perception of whether lack of treatment will lead to morbidity in the diver.

### **Specific Description:**

#### **Cat A-1.    Definite DCS requiring recompression.**

- Any suspicious symptoms leading to and relieved by recompression
- Joint pain persisting as tabulated below whether recompressed or not:

		<b>One Joint</b>	<b>Multiple Joints</b>
<b>Pain</b>	Mild	60 min +	30 min +
	Moderate	30 min +	15 min +
	Severe	15 min +	8 min +

- Dyspnea, unless clearly from barotrauma or anxiety hyperventilation syndrome
- Any spinal neurologic symptoms, supported by signs, regardless of duration
- Any brain symptoms, such as visual blurring, "mental sluggishness", regardless of duration
- Any inner ear symptom, such as unsteadiness, vertigo, hearing loss, unless clearly from barotrauma

#### **Cat A-2.    Definite DCS not requiring recompression.**

- Joint pain not persisting as long as tabulated under A-1
- Fatigue, moderate or severe
- Skin itch in immersed air or N<sub>2</sub>-O<sub>2</sub> divers (Itch in dry chamber dives and HeO<sub>2</sub> dives is probably due to local skin mechanisms that would confuse modeling of primary symptoms)
- Skin rash or mottling, if only symptoms (When combined with non-persistent (A-2) joint pain becomes A-1).
- Default diagnosis) Symptoms reported as "Mild bends, not requiring recompression" which do not fit other categorization criteria

#### **Cat B.      Unknown outcome; data insufficient for 1988 diagnosis**

- Headache, typical and common for this diver
- Vague abdominal pain, not related to trauma or barotrauma
- Vague chest pain, not related to trauma or barotrauma
- Vague symptoms of any kind NOT responding to recompression or oxygen therapy attempted soon after dive (say 18 hours for non-sat dive).

#### **Cat C.      Not DCS**

- No post-dive symptoms reported
- Joint pain or fatigue, mild and consistent with recent exercise
- Sharp pain, consistent with joint sprain or impact injury
- Vague symptoms similar to Cat A-2 NOT responding to recompression therapy attempted not soon after dive
- Skin itch in dry chamber dives and He-O<sub>2</sub> dives.





## **SECTION I: SINGLE AIR DIVES**

### **A. DC4D**

- 797 dives: 19 DCS, 4 Marginal
- All dives were dry
- Dives were conducted during the period 1978-1986
- Exercise was not required of the "dry non-working subjects" (ref. 1).
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of DCS manifestations were compiled from the reports referenced below and hand-written notes made from previous reviews made of the dive logs by P.K. Weathersby with numerous questions answered by R.Y. Nishi.

1. Nishi R.Y., KE Kisman, IP Buckingham, BC Eatock and G Masurel. XDC-2 digital decompression computer: assessment of decompression profiles by ultrasonic monitoring, Phase I: 36-54 msw. DCIEM Report 80-R-32, July 1980.

2. Nishi RY, BC Eatock, IC Buckingham and G Masurel. . XDC-2 digital decompression computer: assessment of decompression profiles by ultrasonic monitoring, Phase II: 30-75 msw. DCIEM Report 81-R-02, January 1981.

3. Nishi, RY, BC Eatock, IP Buckingham and BA Ridgewell. Assessment of decompression profiles by ultrasonic monitoring. Phase III: No-decompression dives. DCIEM Report 82-R-38, August 1982.

4. Nishi, RY, KE Kisman, BC Eatock, TP Buckingham and G Masurel. Assessment of decompression profiles and divers by doppler ultrasonic monitoring. In: Proceedings VII Symposium on Underwater Physiology, AJ Bachrach and MM Matzen eds., 1982.

5. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F) DCIEM Report 84-R-72, Oct 1984.

6. Lauckner, GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series G-K) DCIEM Report 84-R-73, Nov. 1984.

7. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series L-Q) DCIEM Report 85-R-18, Apr 1985.



## SECTION I: SINGLE AIR DIVES

### A. DC4D

797 dives: 19 DCS, 4 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
2	DCS	120.3	1022.3	Type II Pain in left leg "and other symptoms of Type II decompression sickness"; symptoms 18 hrs post dive.
3	DCS	30.3	60.3	Type I. Diver EN reported a "crick" in his right shoulder approximately one hour after surfacing from the dive to 36 msw for 50 minutes. He had grade 3- bubbles at rest and 3+ following movement at that time. He experienced full relief on being treated. This diver was 37 years old and was below his recommended weight range. (Report 80-R-32 pg 12)
4	Marginal	120.3	1260.3	Possible bends treated; complained of slight itching at approx 55 min "ET"; developed slight itching on back of neck at 90 min "ET" (*these notes are shown in order as they appear on the computer printout; it appears as though he was considered marginal, treated, and then the itching symptoms were reported; other entries describe "post surfacing", only this one refers to "ET")
7	DCS	119.7	229.7	Type I. Diver Rle felt a slight discomfort in his left calf about 4 hours after the dive to 36 msw for 40 minutes, which was alleviated on treatment. This diver ran for 5 miles the day before the dive. However, he also ran for 3 or 4 miles before three of his other dives. There appeared to be no influence on the degree of bubbling whether he ran or not the day before. This diver was 25 years old and his weight was well below his recommended weight range. (Report 80-R-32 pg 12)
12	DCS	-1.3	8.0	Type I. The low bubbler, YL, was a dry non-working diver on the dive to 45 msw for 30 minutes. Prior to this dive, he had registered only a maximum of grade 1 bubbles. On exiting from the chamber after the dive, this subject was extremely active, coiling the dive umbilical lines and stowing away the KMB-9 masks. Eight minutes after surfacing, the subject had pain in his shoulder, with bubble grade 3 on rest and bubble grade 4 on movement, and fainted for several seconds. The subject was recompressed and experienced full relief soon after reaching the treatment depth of 18 msw. This subject was 28 years old and was slightly above his recommended weight range as based on his skin-fold measurements. The increased activity after surfacing could have been a contributing factor, since on subsequent dives in which he did not exercise after decompression, he reverted back to grade 0 bubbles on two dives, had a maximum of grade 1 on another dive, and grade 2 on a fourth dive. After this decompression incident, all subjects were cautioned against excessive movement after surfacing because it was felt that movement could contribute to bubble formation. (Report 80-R-32 pg 12)
17	DCS	0	111.0	Type I. Because one subject (MK) incurred decompression sickness with grade 2 bubbles, it would appear that there may be a small probability that grade 2 bubbles could result in decompression sickness. The symptoms in this case were a vague feeling of discomfort in the right shoulder and vague feelings of malaise. The subject was given a trial recompression to 18 msw on oxygen and felt better. A full U.S. Navy Table 5 treatment was then given. The subject had been involved in moving his home for a week prior to the dive and had many late nights and was not feeling his usual self before the dive. The subject was a high bubbler, 32 years old, and slightly above his recommended weight range based on skin-fold measurement. (Report 80-R-32 pg 12) (note on computer print out indicated that he was treated on a different day than the dive)
23	Marginal	*	*	no symptoms described for marginals

23	Marginal	*	*	no symptoms described for marginals
38	DCS	120.0	1202.0	20 hours post dive, soreness in fingers both hands
40	DCS	10.0	30.0	30 min post dive, vague pain in left shoulder and back of arm; 2.5 hrs post dive, very definite pain
42	DCS	120.0	1201.0	20 hrs post dive, swelling and pain left wrist and right hand
66	DCS	30.0	90.0	90 min post dive, pain right elbow and shoulder, received treatment. Following day (31 Jan 79; 18 hrs post dive) pain left shoulder, treated again
67	DCS	120.0	180.0	3 hrs post dive, pain both shoulders and chest; treated
120	DCS	-49.0	0	Type I. Pain in right hip after leaving 3 msw (10') stop; restricted circulation may have been a contributing factor
126	DCS	120.0	437.0	Type II. Numbness in fingers & knee and extreme fatigue evening following dive (dive had originally been planned for a 25 min bottom time)
133	DCS	100.4	299.4	Type I. Pain in right ankle 5 hrs post dive; complete relief on TT6; reported "twisting" his ankle evening before the dive, but there was no pain pre-dive.
134	DCS	30.0	169.4	Type I. Reported pain in left shoulder 3.5 hrs after leaving bottom; complete relief on TT5.
135	DCS	-53.3	0	Type I. Pain in right wrist immediately upon surfacing; complete relief on TT6.
138	DCS	-48.1	1081.7	Type I. Itching in right shoulder immediately following the dive; on surface O <sub>2</sub> while treatment preps were made got complete relief; later same evening mild pain in right shoulder & elbow; TT6 (10 hrs post dive?); dull "ache" remained and was relieved gradually over treatment period; subject reported very heavy exercises just prior to dive with little sleep the night before.
191	DCS	10.0	45.0	Type I. (no symptoms described)
201	DCS	10.0	60.0	Type I. Approx 1 hour post dive, (no symptoms described)
201	DCS	10.0	60.0	Type I. Approx 1 hour post dive, (no symptoms described)
254	Marginal	*	*	Residual ache that persisted and went away when diver was a tender on a dive 7 days later; was treated

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC4D	0.0	4	178.0	3.8	24.8			DR0002A 1 REPETS=1
2	DC4D	1.0	1	119.0	50.1	57.6	228.0	1130.0	DR0003A 5 REPETS=1
3	DC4D	1.0	1	119.0	50.1	57.6	138.0	168.0	DR0003A 6 REPETS=1
4	DC4D	0.5	1	119.0	50.1	57.6	228.0	1368.0	DR0003A 7 REPETS=1
5	DC4D	0.0	1	119.0	50.1	57.6			DR0003A 8 REPETS=1
6	DC4D	0.0	4	120.0	40.1	41.4			DR0006A 9 REPETS=1
7	DC4D	1.0	1	119.0	40.0	43.3	203.0	323.0	DR0007A 13 REPETS=1
8	DC4D	0.0	3	119.0	40.0	43.3			DR0007A 14 REPETS=1
9	DC4D	0.0	4	120.0	5.0	56.4			DR0009A 17 REPETS=1
10	DC4D	0.0	4	121.0	2.3	61.2			DR0010A 21 REPETS=1
11	DC4D	0.0	4	150.0	3.5	48.5			DR0011A 25 REPETS=1
12	DC4D	1.0	1	152.0	3.0	77.5	79.2	88.5	DR0012A 29 REPETS=1
13	DC4D	0.0	3	152.0	3.0	77.5			DR0012A 30 REPETS=1
14	DC4D	0.0	4	150.0	4.9	57.3			DR0014A 33 REPETS=1
15	DC4D	0.0	4	150.0	25.0	38.8			DR0015A 37 REPETS=1
16	DC4D	0.0	4	150.0	29.9	47.2			DR0016A 41 REPETS=1
17	DC4D	1.0	1	180.0	15.0	32.0	47.0	158.0	DR0019A 45 REPETS=1
18	DC4D	0.0	3	180.0	15.0	32.0			DR0019A 46 REPETS=1
19	DC4D	0.0	4	180.0	19.9	40.0			DR0021A 49 REPETS=1
20	DC4D	0.0	4	181.0	3.9	58.1			DR0022A 53 REPETS=1
21	DC4D	0.0	4	181.0	3.3	77.3			DR0023A 57 REPETS=1
22	DC4D	0.0	2	180.0	25.0	56.0			DR0024A 61 REPETS=1
23	DC4D	0.5	2	180.0	25.0	56.0	0.0	0.0	DR0024A 61 REPETS=1
24	DC4D	0.0	4	181.0	3.3	44.2			DR0025A 65 REPETS=1
25	DC4D	0.0	5	220.0	10.0	31.0			DR0026A 69 REPETS=1
26	DC4D	0.0	5	220.0	4.3	36.7			DR0027A 74 REPETS=1
27	DC4D	0.0	5	250.0	10.0	38.2			DR0028A 79 REPETS=1
28	DC4D	0.0	5	251.0	4.3	38.5			DR0029A 84 REPETS=1
29	DC4D	0.0	5	220.0	15.0	45.1			DR0030A 89 REPETS=1
30	DC4D	0.0	5	220.0	15.0	44.0			DR0031A 94 REPETS=1
31	DC4D	0.0	5	100.0	55.0	41.0			DR0032A 99 REPETS=1
32	DC4D	0.0	5	102.0	1.5	95.2			DR0033A 104 REPETS=1

33	DC4D	0.0	5	180.0	2.9	59.9	DR0034A	109 REPETS=1
34	DC4D	0.0	5	182.0	3.1	79.4	DR0035A	114 REPETS=1
35	DC4D	0.0	1	61.0	89.8	58.5	DR0036A	119 REPETS=1
36	DC4D	0.0	1	60.0	119.6	29.4	DR0040A	120 REPETS=1
37	DC4D	0.0	2	94.0	70.0	54.0	DD1692A	121 REPETS=1
38	DC4D	1.0	1	146.0	23.0	95.0	DD1693A	123 REPETS=1
39	DC4D	0.0	1	146.0	23.0	95.0	DD1693A	124 REPETS=1
40	DC4D	1.0	1	145.0	45.0	73.0	DD1694A	125 REPETS=1
41	DC4D	0.0	1	145.0	45.0	73.0	DD1694A	126 REPETS=1
42	DC4D	1.0	1	196.0	15.0	84.0	DD1695A	127 REPETS=1
43	DC4D	0.0	1	196.0	15.0	84.0	DD1695A	128 REPETS=1
44	DC4D	0.0	7	170.0	10.0	21.0	DD1708A	129 REPETS=1
45	DC4D	0.0	6	200.0	10.0	24.0	DD1711A	136 REPETS=1
46	DC4D	0.0	5	200.0	10.0	25.0	DD1712A	142 REPETS=1
47	DC4D	0.0	2	96.0	29.0	19.0	DD1719A	147 REPETS=1
48	DC4D	0.0	2	96.0	28.0	18.0	DD1720A	149 REPETS=1
49	DC4D	0.0	2	95.0	26.0	16.0	DD1721A	151 REPETS=1
50	DC4D	0.0	1	230.0	17.0	43.0	DD1727A	153 REPETS=1
51	DC4D	0.0	6	180.0	12.0	18.0	DD1730A	154 REPETS=1
52	DC4D	0.0	2	165.0	10.0	8.0	DD1731A	160 REPETS=1
53	DC4D	0.0	2	165.0	10.0	15.0	DD1734A	162 REPETS=1
54	DC4D	0.0	2	165.0	10.0	16.0	DD1735A	164 REPETS=1
55	DC4D	0.0	2	165.0	10.0	11.0	DD1736A	166 REPETS=1
56	DC4D	0.0	2	165.0	10.0	14.0	DD1738A	168 REPETS=1
57	DC4D	0.0	1	175.0	15.0	28.0	DD1751A	170 REPETS=1
58	DC4D	0.0	2	175.0	13.0	24.0	DD1760A	171 REPETS=1
59	DC4D	0.0	6	180.0	14.0	26.0	DD1764A	173 REPETS=1
60	DC4D	0.0	7	170.0	15.0	28.0	DD1768A	179 REPETS=1
61	DC4D	0.0	7	250.0	10.0	32.0	DD1770A	186 REPETS=1
62	DC4D	0.0	2	197.0	13.0	25.0	DD1782A	193 REPETS=1
63	DC4D	0.0	4	180.0	15.0	15.0	DD1785A	195 REPETS=1
64	DC4D	0.0	6	167.0	10.0	17.0	DD1786A	199 REPETS=1
65	DC4D	0.0	6	169.0	10.0	17.0	DD1787A	205 REPETS=1
66	DC4D	1.0	1	290.0	10.0	41.0	DD1793A	211 REPETS=1
67	DC4D	1.0	1	290.0	10.0	41.0	DD1793A	212 REPETS=1
68	DC4D	0.0	3	290.0	10.0	41.0	DD1793A	213 REPETS=1
69	DC4D	0.0	5	170.0	15.0	27.0	DD1797A	216 REPETS=1

70	DC4D	0.0	2	95.0	14.0	6.0	DD1798A	221 REPETS=1
71	DC4D	0.0	2	95.0	14.0	6.0	DD1799A	223 REPETS=1
72	DC4D	0.0	2	170.0	14.0	25.0	DD1802A	225 REPETS=1
73	DC4D	0.0	2	170.0	14.0	25.0	DD1803A	227 REPETS=1
74	DC4D	0.0	2	169.0	15.0	26.0	DD1804A	229 REPETS=1
75	DC4D	0.0	2	10.0	1.0	1.0	DD1805A	231 REPETS=2
76	DC4D	0.0	2	197.0	10.0	26.0	DD1806A	233 REPETS=1
77	DC4D	0.0	2	195.0	12.0	28.0	DD1807A	235 REPETS=1
78	DC4D	0.0	2	195.0	15.0	33.0	DD1808A	237 REPETS=1
79	DC4D	0.0	2	195.0	12.0	28.0	DD1809A	239 REPETS=1
80	DC4D	0.0	2	165.0	12.0	12.0	DD1814A	241 REPETS=1
81	DC4D	0.0	2	165.0	6.0	31.0	DD1815A	243 REPETS=1
82	DC4D	0.0	6	170.0	10.0	15.0	DD1820A	245 REPETS=1
83	DC4D	0.0	5	178.0	14.0	28.0	DD1827A	251 REPETS=1
84	DC4D	0.0	4	174.0	10.0	16.0	DD1831A	256 REPETS=1
85	DC4D	0.0	2	165.0	5.0	18.0	DD1832A	260 REPETS=1
86	DC4D	0.0	7	170.0	10.0	18.0	DD1856A	262 REPETS=1
87	DC4D	0.0	7	200.0	10.0	22.0	DD1857A	269 REPETS=1
88	DC4D	0.0	2	195.0	10.0	23.0	DD1865A	276 REPETS=1
89	DC4D	0.0	3	165.0	10.0	15.0	DD1866A	278 REPETS=1
90	DC4D	0.0	2	164.0	10.0	15.0	DD1867A	281 REPETS=1
91	DC4D	0.0	2	165.0	6.0	20.0	DD1868A	283 REPETS=1
92	DC4D	0.0	2	195.0	9.0	17.0	DD1869A	285 REPETS=1
93	DC4D	0.0	1	180.0	13.0	27.5	DD1724A	287 REPETS=1
94	DC4D	0.0	2	165.0	11.0	11.0	DD1737A	288 REPETS=1
95	DC4D	0.0	2	175.0	15.0	25.0	DD1761A	290 REPETS=1
96	DC4D	0.0	1	67.0	28.0	11.1	DR0094A	292 REPETS=1
97	DC4D	0.0	1	67.0	18.0	4.6	DR0097A	293 REPETS=1
98	DC4D	0.0	1	67.0	28.0	10.7	DR0098A	294 REPETS=1
99	DC4D	0.0	1	67.0	19.5	4.5	DR0099A	295 REPETS=1
100	DC4D	0.0	1	67.0	28.5	10.5	DR0100A	296 REPETS=1
101	DC4D	0.0	1	67.0	18.5	4.6	DR0101A	297 REPETS=1
102	DC4D	0.0	1	168.0	20.0	54.9	DR0102A	298 REPETS=1
103	DC4D	0.0	1	168.0	20.0	57.2	DR0103A	299 REPETS=1
104	DC4D	0.0	1	134.0	20.0	35.9	DR0104A	300 REPETS=1
105	DC4D	0.0	2	142.0	9.0	9.3	DR0106A	301 REPETS=1
106	DC4D	0.0	1	134.0	20.0	35.9	DR0107A	303 REPETS=1

107	DC4D	0.0	1	134.0	19.0	36.5	DR0108A	304 REPETS=1
108	DC4D	0.0	2	168.0	19.5	55.2	DR0109A	305 REPETS=1
109	DC4D	0.0	1	168.0	19.0	55.3	DR0110A	307 REPETS=1
110	DC4D	0.0	2	100.0	10.0	3.1	DR0141A	308 REPETS=1
111	DC4D	0.0	10	167.0	10.0	19.3	DR0145A	310 REPETS=1
112	DC4D	0.0	8	112.0	15.0	12.1	DR0147A	320 REPETS=1
113	DC4D	0.0	2	120.0	25.0	20.9	DR0201A	328 REPETS=1
114	DC4D	0.0	2	150.0	20.0	24.9	DR0202A	330 REPETS=1
115	DC4D	0.0	4	60.0	80.0	11.1	DR0203A	332 REPETS=1
116	DC4D	0.0	1	90.0	40.0	17.1	DR0204A	336 REPETS=1
117	DC4D	0.0	2	120.0	25.0	19.2	DR0205A	337 REPETS=1
118	DC4D	0.0	3	150.0	20.0	24.6	DR0206A	339 REPETS=1
119	DC4D	0.0	1	180.0	15.0	25.1	DR0207A	342 REPETS=1
120	DC4D	1.0	1	120.0	50.0	69.6	DR0208A	343 REPETS=1
121	DC4D	0.0	2	120.0	50.0	69.6	DR0208A	344 REPETS=1
122	DC4D	0.0	2	150.0	30.0	57.7	DR0209A	346 REPETS=1
123	DC4D	0.0	3	173.0	25.0	66.5	DR0210A	348 REPETS=1
124	DC4D	0.0	3	121.0	50.0	71.0	DR0211A	351 REPETS=1
125	DC4D	0.0	5	150.0	30.0	59.0	DR0213A	354 REPETS=1
126	DC4D	1.0	1	180.0	21.0	52.0	DR0214A	359 REPETS=1
127	DC4D	0.0	2	180.0	21.0	52.0	DR0214A	360 REPETS=1
128	DC4D	0.0	7	180.0	30.0	89.5	DR0280A	362 REPETS=1
129	DC4D	0.0	8	180.0	30.0	86.2	DR0284A	369 REPETS=1
130	DC4D	0.0	2	50.0	100.0	6.0	DR0302A	377 REPETS=1
131	DC4D	0.0	2	90.0	60.0	42.5	DR0303A	379 REPETS=1
132	DC4D	0.0	1	90.0	60.0	41.5	DR0307A	381 REPETS=1
133	DC4D	1.0	1	150.0	40.0	84.6	DR0340A	382 REPETS=1
134	DC4D	1.0	1	150.0	40.0	84.6	DR0340A	383 REPETS=1
135	DC4D	1.0	1	150.0	40.0	84.6	DR0340A	384 REPETS=1
136	DC4D	0.0	6	150.0	40.0	84.6	DR0340A	385 REPETS=1
137	DC4D	0.0	1	110.0	10.0	3.3	DR0352A	391 REPETS=1
138	DC4D	1.0	1	120.0	50.0	68.3	DR0364A	392 REPETS=1
139	DC4D	0.0	7	120.0	50.0	68.3	DR0364A	393 REPETS=1
140	DC4D	0.0	12	80.0	30.0	6.0	DR0366A	400 REPETS=1
141	DC4D	0.0	11	110.0	15.0	6.1	DR0367A	412 REPETS=1
142	DC4D	0.0	9	150.0	40.0	81.4	DR0368A	423 REPETS=1
143	DC4D	0.0	1	150.0	15.0	17.5	DR0375A	432 REPETS=1

144	DC4D	0.0	4	183.0	10.0	16.9	DR0432A	433 REPETS=1
145	DC4D	0.0	4	157.0	12.9	24.1	DR0433A	437 REPETS=1
146	DC4D	0.0	1	183.0	7.0	17.1	DR0453A	441 REPETS=1
147	DC4D	0.0	5	183.0	10.0	17.2	DR0454A	442 REPETS=1
148	DC4D	0.0	2	180.0	9.0	13.9	DR0502A	447 REPETS=1
149	DC4D	0.0	2	122.0	16.0	15.5	DR0525A	449 REPETS=1
150	DC4D	0.0	2	102.0	8.0	2.7	DR0529A	451 REPETS=1
151	DC4D	0.0	2	110.0	11.0	5.7	DD1876A	453 REPETS=1
152	DC4D	0.0	1	95.0	2.3	38.1	DD1877A	455 REPETS=1
153	DC4D	0.0	1	95.0	29.5	10.6	DD1878A	456 REPETS=1
154	DC4D	0.0	1	147.0	7.0	4.0	DD1883A	457 REPETS=1
155	DC4D	0.0	1	54.0	40.0	1.2	DD1884A	458 REPETS=1
156	DC4D	0.0	1	148.0	12.0	2.5	DD1892A	459 REPETS=1
157	DC4D	0.0	1	95.0	16.0	6.5	DD1893A	460 REPETS=1
158	DC4D	0.0	1	197.0	4.0	25.3	DD1894A	461 REPETS=1
159	DC4D	0.0	1	196.0	9.0	21.5	DD1895A	462 REPETS=1
160	DC4D	0.0	1	198.0	3.3	8.2	DD1896A	463 REPETS=1
161	DC4D	0.0	1	228.0	5.0	3.9	DD1899A	464 REPETS=1
162	DC4D	0.0	1	228.0	6.0	4.0	DD1900A	465 REPETS=1
163	DC4D	0.0	1	228.0	5.9	3.9	DD1901A	466 REPETS=1
164	DC4D	0.0	4	98.0	14.0	1.7	DD1902A	467 REPETS=1
165	DC4D	0.0	8	194.0	8.0	3.4	DD1903A	471 REPETS=1
166	DC4D	0.0	5	195.0	3.3	9.1	DD1904A	479 REPETS=1
167	DC4D	0.0	4	98.0	21.0	1.7	DD1905A	484 REPETS=1
168	DC4D	0.0	4	97.0	21.0	1.7	DD1906A	488 REPETS=1
169	DC4D	0.0	4	97.0	28.0	1.7	DD1907A	492 REPETS=1
170	DC4D	0.0	4	97.0	28.0	1.7	DD1908A	496 REPETS=1
171	DC4D	0.0	4	146.0	11.3	2.5	DD1909A	500 REPETS=1
172	DC4D	0.0	4	147.0	11.3	2.6	DD1910A	504 REPETS=1
173	DC4D	0.0	4	147.0	15.5	2.5	DD1911A	508 REPETS=1
174	DC4D	0.0	4	147.0	15.5	2.6	DD1912A	512 REPETS=1
175	DC4D	0.0	4	197.0	10.0	3.5	DD1913A	516 REPETS=1
176	DC4D	0.0	4	197.0	10.0	3.4	DD1914A	520 REPETS=1
177	DC4D	0.0	4	65.0	40.0	1.1	DD1915A	524 REPETS=1
178	DC4D	0.0	4	54.0	60.0	1.0	DD1916A	528 REPETS=1
179	DC4D	0.0	4	77.0	40.0	1.3	DD1917A	532 REPETS=1
180	DC4D	0.0	4	62.0	60.0	1.1	DD1918A	536 REPETS=1

181	DC4D	0.0	4	61.0	60.0	1.1	DD1919A	540 REPETS= 1
182	DC4D	0.0	4	229.0	7.5	4.1	DD1920A	544 REPETS= 1
183	DC4D	0.0	4	229.0	7.5	4.0	DD1921A	548 REPETS= 1
184	DC4D	0.0	4	229.0	7.5	4.1	DD1922A	552 REPETS= 1
185	DC4D	0.0	4	262.0	5.5	4.6	DD1923A	556 REPETS= 1
186	DC4D	0.0	4	262.0	5.5	4.6	DD1924A	560 REPETS= 1
187	DC4D	0.0	2	147.0	16.0	2.5	DD1926A	564 REPETS= 1
188	DC4D	0.0	6	180.0	10.0	16.0	DD1927A	566 REPETS= 1
189	DC4D	0.0	2	147.0	16.0	2.4	DD1928A	572 REPETS= 1
190	DC4D	0.0	2	146.0	15.5	2.5	DD1929A	574 REPETS= 1
191	DC4D	1.0	1	146.0	15.5	2.5	DD1930A	576 REPETS= 1
192	DC4D	0.0	1	146.0	15.5	2.5	DD1930A	577 REPETS= 1
193	DC4D	0.0	2	147.0	14.2	2.5	DD1932A	578 REPETS= 1
194	DC4D	0.0	2	195.0	9.0	3.3	DD1933A	580 REPETS= 1
195	DC4D	0.0	2	195.0	9.0	3.5	DD1935A	582 REPETS= 1
196	DC4D	0.0	2	228.0	6.8	3.9	DD1936A	584 REPETS= 1
197	DC4D	0.0	2	176.0	14.0	21.0	DD1967A	586 REPETS= 1
198	DC4D	0.0	5	170.0	10.0	17.0	DD1993A	588 REPETS= 1
199	DC4D	0.0	4	170.0	10.0	19.0	DD1994A	593 REPETS= 1
200	DC4D	0.0	3	175.0	15.0	32.9	DD1999A	597 REPETS= 1
201	DC4D	1.0	2	165.0	10.0	18.0	DD2000A	600 REPETS= 1
202	DC4D	0.0	1	165.0	10.0	18.0	DD2000A	602 REPETS= 1
203	DC4D	0.0	2	96.0	3.7	24.5	DD2014A	603 REPETS= 1
204	DC4D	0.0	2	96.0	18.0	10.4	DD2015A	605 REPETS= 1
205	DC4D	0.0	1	180.0	9.0	15.5	DD2094A	607 REPETS= 1
206	DC4D	0.0	2	180.0	9.0	15.9	DD2095A	608 REPETS= 1
207	DC4D	0.0	6	165.0	9.0	11.8	DD2096A	610 REPETS= 1
208	DC4D	0.0	5	100.0	20.0	12.7	DD2101A	616 REPETS= 1
209	DC4D	0.0	3	100.0	20.0	12.5	DD2102A	621 REPETS= 1
210	DC4D	0.0	1	119.0	9.0	2.3	DD2172A	624 REPETS= 1
211	DC4D	0.0	1	119.0	9.0	2.1	DD2173A	625 REPETS= 1
212	DC4D	0.0	3	119.0	9.0	2.1	DD2174A	626 REPETS= 1
213	DC4D	0.0	2	119.0	9.0	2.2	DD2177A	629 REPETS= 1
214	DC4D	0.0	1	119.0	9.0	2.4	DD2179A	631 REPETS= 1
215	DC4D	0.0	2	119.0	9.0	2.2	DD2180B	632 REPETS= 1
216	DC4D	0.0	1	120.0	9.0	2.2	DD2182B	634 REPETS= 1
217	DC4D	0.0	1	119.0	9.0	2.4	DD2183B	635 REPETS= 1



218	DC4D	0.0	1	119.0	9.0	2.2	DD2184B	636 REPETS= 1
219	DC4D	0.0	1	120.0	9.0	2.1	DD2185B	637 REPETS= 1
220	DC4D	0.0	1	120.0	9.0	2.3	DD2200B	638 REPETS= 1
221	DC4D	0.0	1	120.0	9.0	2.2	DD2201B	639 REPETS= 1
222	DC4D	0.0	1	121.0	9.0	2.1	DD2203B	640 REPETS= 1
223	DC4D	0.0	2	120.0	9.0	2.1	DD2204B	641 REPETS= 1
224	DC4D	0.0	1	95.0	14.0	6.0	DD2283A	643 REPETS= 1
225	DC4D	0.0	6	70.0	35.0	1.4	DD2284A	644 REPETS= 1
226	DC4D	0.0	6	83.0	2.8	23.6	DD2285A	650 REPETS= 1
227	DC4D	0.0	6	90.0	20.0	1.8	DD2286A	656 REPETS= 1
228	DC4D	0.0	6	60.0	50.0	1.1	DD2287A	662 REPETS= 1
229	DC4D	0.0	6	26.0	1.0	0.4	DD2288A	668 REPETS= 2
230	DC4D	0.0	6	110.0	12.0	2.2	DD2289A	674 REPETS= 1
231	DC4D	0.0	4	50.0	75.0	1.0	DD2290A	680 REPETS= 1
232	DC4D	0.0	6	120.0	10.0	2.1	DD2291A	684 REPETS= 1
233	DC4D	0.0	5	130.0	8.0	2.3	DD2292A	690 REPETS= 1
234	DC4D	0.0	4	71.0	35.0	1.3	DD2293A	695 REPETS= 1
235	DC4D	0.0	5	80.0	25.0	1.6	DD2294A	699 REPETS= 1
236	DC4D	0.0	5	90.0	20.0	1.7	DD2295A	704 REPETS= 1
237	DC4D	0.0	5	60.0	50.0	1.3	DD2296A	709 REPETS= 1
238	DC4D	0.0	5	100.0	15.0	1.9	DD2297A	714 REPETS= 1
239	DC4D	0.0	5	120.0	10.0	2.2	DD2298A	719 REPETS= 1
240	DC4D	0.0	4	50.0	75.0	1.0	DD2299A	724 REPETS= 1
241	DC4D	0.0	6	110.0	12.0	2.1	DD2300A	728 REPETS= 1
242	DC4D	0.0	4	130.0	8.0	2.4	DD2301A	734 REPETS= 1
243	DC4D	0.0	6	140.0	7.0	2.5	DD2302A	738 REPETS= 1
244	DC4D	0.0	6	140.0	7.0	2.5	DD2303A	744 REPETS= 1
245	DC4D	0.0	5	140.0	7.0	2.7	DD2304A	750 REPETS= 1
246	DC4D	0.0	7	165.0	12.0	23.2	DD2308A	755 REPETS= 1
247	DC4D	0.0	7	165.0	12.0	23.3	DD2309A	762 REPETS= 1
248	DC4D	0.0	6	148.0	7.0	2.6	DD2310A	769 REPETS= 1
249	DC4D	0.0	6	158.0	6.0	2.6	DD2311A	775 REPETS= 1
250	DC4D	0.0	4	168.0	5.0	3.1	DD2314A	781 REPETS= 1
251	DC4D	0.0	5	178.0	5.0	3.2	DD2315A	785 REPETS= 1
252	DC4D	0.0	5	136.0	2.6	7.7	DD2440A	790 REPETS= 1
253	DC4D	0.0	2	164.0	10.0	18.0	DD2002A	795 REPETS= 1
254	DC4D	0.5	1	164.0	10.0	18.0	DD2002A	795 REPETS= 1

## **SECTION I: SINGLE AIR DIVES**

### **B. EDU557A**

- 568 dives: 27 DCS, 0 Marginal
- All dives were wet, “no temperature controls were maintained during the dives. The temperature was generally comfortable throughout the dive.” (ref 1)
- Dives were conducted during the period June 1956 through November 1956
- Exercise: all divers “worked”; dives were “made with a variety of diving suits and approved breathing apparatus” (ref 1).
- This data set is included in the report, Statistically Based Decompression Tables I.
- Incidents of DCS were reported as a number only in ref 1; descriptions of the manifestations were taken from the archived dive logs at NEDU.

1. M. des Granges. Standard Air Decompression Table. Navy Experimental Diving Unit Research Report 5-57. December 1956.

## SECTION I: SINGLE AIR DIVES

**B. EDU557A**

**568 dives: 27 DCS, 0 Marginal**

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
7	120.7	240.7	Offset ( <i>sic</i> ) of dull interrupted pain in left arm about 4 hours after dive followed by pain of same character in left knee. The pain in these areas did not increase but became steady during the night. No muscular weakness, or change in reflexes or sensations; Table II. Rx began 0916 on 07 Sept (18 h 3 min post-dive); relief of pain in left arm and knee at 34 ft, slight soreness; at 47 ft developed itch in left elbow. At 100 ft developed rash on left elbow. At 165 ft there was a little soreness and itch in left elbow. All soreness of left elbow and knee gone after 15 minutes at 165'
13	30.4	126.4	Complained of mild ache in rt. elbow region about 1330; little change during 30 min observation; Rx began 1422 (2 h 58 min post -dive); 06 reach 40 feet - complete relief. Taking man down to 100 ft.
14	30.4	161.4	Transient haziness of peripheral visual fields (1240/1315); mild dull ache left arm at same time, largely disappeared; pain in arm increased and became sharp at about 1430; Table II Rx began 1447 (2 h 58 min post-dive); +3 at 60 ft pain slightly relieved. Going down to 165; +8 reached 165 (pain completely relieved at 80 feet).
21	-73.8	120	Reached surface 1501.40 sec; pain right shoulder right elbow and an ache in right wrist; Table I Rx began 1702 (2 hr post-dive); partial relief at 12 ft; at 18 ft, 1 <sup>st</sup> 45 sec pain completely gone, no symptoms. Same date, ( <i>diver's name deleted</i> ) recurrence from Table #1 ( <i>sic</i> ); Rx began 1959 partial relief @ 9ft; @18ft pain nearly complete; @30ft pain relieved, arm weak; @40ft strength returned (complete relief)
24	-51.3	15.2	FP1 pain in left leg, right hand. Rx began 2011 (4 h 43 min post-dive). At 11' considerable relief; complete relief at 20'; late entry (pg 99) Adams remarks: subject man noticed numbness 15 minutes after surfacing, dorsal aspect index finger to corresp part of hand.
25	-87.8	324.5	MEC pain in RT arm - numbness in RT hand Table II3 ( <i>sic</i> ). Rx began 2053 (5 h 25 min post-dive); at 120' soreness in RT wrist and last finger on RT hand; at 165' (2101) soreness gone; at 30' (2:56 into Rx) went for swim feels OK
35	47.1	33.0	Pain in right shoulder radiating to arm; Table I; Rx began 1019 (33 min post-dive); +1' at 6 ft partial relief; +3 at 9 ft complete relief
37	-53.1	50	Pain only right shoulder. Table I; Rx began 1517 (50 min post-dive). Complete relief +4 min 45 sec @ 100'.
40	-70.1	858.0	Bends in right knee; Rx began 0141 on 07 Aug (14 h 18 min post-dive); 8 ft pain seems worse; 12 ft still same; 24 ft still same; 34 ft soreness partially gone, still has pain in back of knee, joint pain gone; 44 ft pain all gone, soreness in muscle in back of knee; 58 ft (15 min) same as at 44 ft going on down to 165 ft; complete relief after 2 min at 165 ft, reached 165 ft at 0200.
46	29.7	179.7	Had a small area of rash, with itching over right shoulder and upper arm, posteriorly about 30 minutes after dive. This disappeared in the following hour. About three hours after the dive, he had a dull-ache in his right shoulder and upper arm and left wrist with some stabbing pain in his right elbow. No muscle weakness or changes in reflexes or sensation. Table II. Rx began 1726 (3 h 36 min post-dive); +1 min @ 14 ft partial relief; +2 min 45 sec @ 48 ft partial relief - held for four minutes; +7 min 45 sec @ 60 ft complete relief.
47	-135.3	591.0	Felt moderate right forearm and right wrist ( <i>sic</i> ). Table II. Rx began 2341 (9 h 51 min post-dive). +5 min 50 sec @ 38 ft partial relief; +9 min 30 sec @ 50 ft, complete relief.
65	0	0	( <i>Not in EDU Log #45 or #52; it is most likely one of the dives that occurred at the Diving School and was not maintained in the EDU logs - these logs could not be located</i> )

70	-136.8	374.2	Pain right upper arm, questionable numbness, right middle finger, Table II; Rx began 1829 (6 h 14 min post-dive); + 35 sec at 14' partial relief; +1'55 sec at 21 ft total relief of upper arm pain; +4'47 sec at 100 ft peculiar sensation right middle finger no longer noted.
87	-58.3	247	Pain right elbow; Table I. Rx began 1353 (4 h 7 min post-dive); +1 12 ft partial relief; +3'40 sec 22 ft complete relief
88	-58.3	4.7	Pain in right arm subscapular area laterally first noticed during 10 ft stop, but some progression of pain after surfacing. 5 minutes after surfacing onset of pain in right upper arm progressing down right forearm dorsal aspect. No numbness, loss of sensation, reflexes or muscle weakness. Table I, Rx began 1004 (21 min post-dive); +5 sec @ 4' partial relief; +1'5 sec @ 8' more relief; +2'8 sec @14' complete relief, going to 100 ft.
90	-64.3	0	Dull left upper abdominal pain; starting at 10 ft stop within 3 minutes of surfacing, but felt it was gas. This became severe on surfacing, and left side and thigh became numb and tingling. Table III. Rx began 1335 (7 min post-dive); # 35' pain in stomach gone, tingling in left leg (sic); @ 84' complete relief.
92	29.7	179.7	Dull pains under right shoulder and upper arm starting 3 hours after surfacing; Table II. Rx began 1917 (4 h 15 min post-dive); Relief of pain @ 90 feet.
104	0	0	<i>(Not in EDU Log #45 or #52; it is most likely one of the dives that occurred at the Diving School and was not maintained in the EDU logs - these logs could not be located)</i>
106	0	120.2	Onset of skin rash on left thorax 10 minutes after surfacing; dull pain in left shoulder posteriorly 10 minutes later lasting about 20 minutes. Dull pain started in left arm above elbow about 2 hours after dive and persisted. Table I. Rx began 1436 (4 h 44 min post-dive); +1'30 sec @ 17' partial relief; +3'20 sec @34' complete relief, little sore.
108	30.2	300.2	Onset of dull pain in left thumb 5 hours after dive with numbness of left thumb and first finger; Rx began 1746 (5 h 42 min post-dive); +1 min 30 sec @ 14' partial relief; +2 min 8 sec @ 18' complete relief.
110	120	705.2	Mild pain noted in right index finger about 1400. About 2400, reported inability to sleep & spread of pain up forearm. No other abnormalities noted on examination. Table II. Rx began 2437 (15 h 16 min post-dive); +30 sec @8' no change; +2 min @32' partial relief of forearm; +2 min 10 sec @32' complete relief of forearm; +4 min @ 60' no change; +10 min 50 sec @88' partial relief of finger; +11 min 35 sec @96' partial relief in finger; 13 min 40 sec @152' complete relief of all symptoms; +14 min 10 sec @ 152' still some soreness.
111	-88.8	75.2	Shaky and pain in left shoulder; Table II. Rx began 1127 (1 h 35 min); +1 min 20 sec @ 35' partial relief of pain; +2 min 50 sec @35' apprehension gone; +3 min 40 sec @50' complete relief of all symptoms.
121	-60.5	75.0	Rash, dizziness, unconsciousness, nausea, vision blurred; Table III, Rx began 1047 (1 h 15 min post-dive); + 33min @ 100 ft eyes fluttered; + 1 hr 40 min @ 150 ft regained consciousness; total treatment time 18 hr 59 min.
127	-62.3	10	Pain in left forearm 10 min after surfacing - 20 min after dive pain in left forearm became severe. Table II. Rx began 1157 (26 min post-dive); Complete relief at 56 ft. At 100 ft it was decided to use table II because of weakness in arm. Weakness felt due to intense pain in arm.
128	120	300	Dull pain in left arm 5 hours after surfacing. Dull testicle pain 3 hours after surfacing lasting 1 hour; Table II; Rx began 1758 (6 h 20 min post-dive); complete relief at 150 feet.
129	-144.8	0	Dull pain in left arm and elbow onset on surfacing; Table I. Rx began 1443 (3 h 5 min post-dive); +1 min 25 sec @ 22' complete relief.
131	-162.8	144.0	General weakness - rash. Table II. Rx began 1359 (2 h 24 min post-dive); +1 min 20 sec @17' feeling better; +3 min 5 sec @94' rash cleared up.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	edu557	0.0	4	37.0	270.0	0.6			EDU557N 1 REPETS=1
2	edu557	0.0	6	57.0	90.0	9.0			EDU557N 5 REPETS=1
3	edu557	0.0	4	67.0	50.0	1.1			EDU557N 11 REPETS=1
4	edu557	0.0	6	67.0	100.0	22.1			EDU557N 15 REPETS=1
5	edu557	0.0	2	77.0	40.0	5.3			EDU557N 21 REPETS=1
6	edu557	0.0	3	77.0	110.0	49.3			EDU557N 23 REPETS=1
7	edu557	1.0	1	77.0	110.0	49.3	280.0	400.0	EDU557N 23 REPETS=1
8	edu557	0.0	6	77.0	110.0	55.3			EDU557N 27 REPETS=1
9	edu557	0.0	4	87.0	70.0	29.4			EDU557N 33 REPETS=1
10	edu557	0.0	8	97.0	40.0	13.6			EDU557N 37 REPETS=1
11	edu557	0.0	6	97.0	90.0	68.6			EDU557N 45 REPETS=1
12	edu557	0.0	6	97.0	100.0	81.6			EDU557N 51 REPETS=1
13	edu557	1.0	1	97.0	100.0	81.6	212.0	308.0	EDU557N 51 REPETS=1
14	edu557	1.0	1	97.0	100.0	81.6	212.0	343.0	EDU557N 51 REPETS=1
15	edu557	0.0	6	97.0	100.0	85.6			EDU557N 59 REPETS=1
16	edu557	0.0	2	97.0	110.0	97.6			EDU557N 65 REPETS=1
17	edu557	0.0	4	107.0	20.0	1.8			EDU557N 67 REPETS=1
18	edu557	0.0	4	107.0	60.0	40.8			EDU557N 71 REPETS=1
19	edu557	0.0	6	107.0	70.0	57.8			EDU557N 75 REPETS=1
20	edu557	0.0	5	107.0	80.0	73.8			EDU557N 81 REPETS=1
21	edu557	1.0	1	107.0	80.0	73.8	80.0	273.8	EDU557N 81 REPETS=1
22	edu557	0.0	6	107.0	80.0	78.8			EDU557N 87 REPETS=1
23	edu557	0.0	4	107.0	90.0	87.8			EDU557N 93 REPETS=1
24	edu557	1.0	1	107.0	90.0	87.8	126.5	193.0	EDU557N 93 REPETS=1
25	edu557	1.0	1	107.0	90.0	87.8	90.0	502.3	EDU557N 93 REPETS=1
26	edu557	0.0	6	107.0	90.0	92.8			EDU557N 99 REPETS=1
27	edu557	0.0	6	117.0	50.0	38.0			EDU557N 105 REPETS=1

28	edu557	0.0	6	117.0	60.0	55.0	EDU557N 111 REPETS=1
29	edu557	0.0	6	117.0	70.0	73.9	EDU557N 117 REPETS=1
30	edu557	0.0	10	117.0	80.0	89.9	EDU557N 123 REPETS=1
31	edu557	0.0	2	117.0	90.0	109.9	EDU557N 133 REPETS=1
32	edu557	0.0	1	127.0	20.0	6.1	EDU557N 135 REPETS=1
33	edu557	0.0	5	127.0	40.0	34.1	EDU557N 136 REPETS=1
34	edu557	0.0	3	127.0	50.0	47.1	EDU557N 141 REPETS=1
35	edu557	1.0	1	127.0	50.0	47.1	EDU557N 141 REPETS=1
36	edu557	0.0	5	127.0	50.0	53.1	EDU557N 145 REPETS=1
37	edu557	1.0	1	127.0	50.0	53.1	EDU557N 145 REPETS=1
38	edu557	0.0	8	127.0	50.0	54.1	EDU557N 151 REPETS=1
39	edu557	0.0	7	127.0	60.0	70.1	EDU557N 159 REPETS=1
40	edu557	1.0	1	127.0	60.0	70.1	EDU557N 159 REPETS=1
41	edu557	0.0	6	127.0	60.0	75.1	EDU557N 167 REPETS=1
42	edu557	0.0	4	137.0	10.0	2.3	EDU557N 173 REPETS=1
43	edu557	0.0	6	137.0	30.0	25.3	EDU557N 177 REPETS=1
44	edu557	0.0	6	137.0	40.0	41.3	EDU557N 183 REPETS=1
45	edu557	0.0	2	137.0	80.0	135.3	EDU557N 189 REPETS=1
46	edu557	1.0	1	137.0	80.0	135.3	EDU557N 189 REPETS=1
47	edu557	1.0	1	137.0	80.0	135.3	EDU557N 189 REPETS=1
48	edu557	0.0	6	137.0	80.0	138.3	EDU557N 193 REPETS=1
49	edu557	0.0	4	147.0	5.0	2.5	EDU557N 199 REPETS=1
50	edu557	0.0	15	147.0	15.0	5.4	EDU557N 203 REPETS=1
51	edu557	0.0	8	147.0	20.0	11.4	EDU557N 218 REPETS=1
52	edu557	0.0	6	147.0	30.0	30.5	EDU557N 226 REPETS=1
53	edu557	0.0	6	147.0	40.0	47.5	EDU557N 232 REPETS=1
54	edu557	0.0	4	157.0	5.0	2.6	EDU557N 238 REPETS=1
55	edu557	0.0	4	157.0	10.0	3.6	EDU557N 242 REPETS=1
56	edu557	0.0	6	157.0	15.0	7.6	EDU557N 246 REPETS=1
57	edu557	0.0	6	157.0	20.0	13.6	EDU557N 252 REPETS=1
58	edu557	0.0	6	157.0	25.0	25.6	EDU557N 258 REPETS=1
59	edu557	0.0	4	167.0	5.0	2.8	EDU557N 264 REPETS=1

60	edu557	0.0	6	167.0	10.0	4.8	EDU557N 268 REPETS= 1
61	edu557	0.0	6	167.0	15.0	9.8	EDU557N 274 REPETS= 1
62	edu557	0.0	6	167.0	20.0	17.8	EDU557N 280 REPETS= 1
63	edu557	0.0	6	167.0	25.0	30.8	EDU557N 286 REPETS= 1
64	edu557	0.0	3	167.0	30.0	41.8	EDU557N 292 REPETS= 1
65	edu557	1.0	1	167.0	30.0	41.8	EDU557N 292 REPETS= 1
66	edu557	0.0	6	167.0	30.0	44.8	EDU557N 296 REPETS= 1
67	edu557	0.0	4	167.0	40.0	65.8	EDU557N 302 REPETS= 1
68	edu557	0.0	2	167.0	50.0	94.8	EDU557N 306 REPETS= 1
69	edu557	0.0	5	167.0	60.0	136.8	EDU557N 308 REPETS= 1
70	edu557	1.0	1	167.0	60.0	136.8	EDU557N 308 REPETS= 1
71	edu557	0.0	2	167.0	70.0	167.8	EDU557N 314 REPETS= 1
72	edu557	0.0	4	177.0	5.0	3.0	EDU557N 316 REPETS= 1
73	edu557	0.0	6	177.0	10.0	4.9	EDU557N 320 REPETS= 1
74	edu557	0.0	6	177.0	15.0	11.9	EDU557N 326 REPETS= 1
75	edu557	0.0	6	177.0	20.0	23.0	EDU557N 332 REPETS= 1
76	edu557	0.0	4	187.0	5.0	3.1	EDU557N 338 REPETS= 1
77	edu557	0.0	6	187.0	10.0	7.1	EDU557N 342 REPETS= 1
78	edu557	0.0	6	187.0	15.0	14.1	EDU557N 348 REPETS= 1
79	edu557	0.0	6	187.0	20.0	27.1	EDU557N 354 REPETS= 1
80	edu557	0.0	6	187.0	25.0	41.1	EDU557N 360 REPETS= 1
81	edu557	0.0	6	187.0	20.0	52.1	EDU557N 366 REPETS= 1
82	edu557	0.0	6	197.0	10.0	8.3	EDU557N 372 REPETS= 1
83	edu557	0.0	15	197.0	15.0	16.3	EDU557N 378 REPETS= 1
84	edu557	0.0	6	197.0	20.0	32.3	EDU557N 393 REPETS= 1
85	edu557	0.0	6	197.0	25.0	45.3	EDU557N 399 REPETS= 1
86	edu557	0.0	2	197.0	30.0	58.3	EDU557N 405 REPETS= 1
87	edu557	1.0	1	197.0	30.0	58.3	EDU557N 405 REPETS= 1
88	edu557	1.0	1	197.0	30.0	58.3	EDU557N 405 REPETS= 1
89	edu557	0.0	1	197.0	30.0	64.3	EDU557N 409 REPETS= 1
90	edu557	1.0	1	197.0	30.0	64.3	EDU557N 409 REPETS= 1
91	edu557	0.0	-3	197.0	30.0	62.3	EDU557N 411 REPETS= 1

92	edu557	1.0	1	197.0	30.0	62.3	122.0	272.0	EDU557N 411 REPETS=1
93	edu557	0.0	6	197.0	30.0	66.3			EDU557N 415 REPETS=1
94	edu557	0.0	10	197.0	30.0	73.3			EDU557N 421 REPETS=1
95	edu557	0.0	6	207.0	10.0	9.5			EDU557N 431 REPETS=1
96	edu557	0.0	6	207.0	15.0	19.5			EDU557N 437 REPETS=1
97	edu557	0.0	6	207.0	20.0	36.5			EDU557N 443 REPETS=1
98	edu557	0.0	6	207.0	30.0	66.5			EDU557N 449 REPETS=1
99	edu557	0.0	4	217.0	5.0	4.6			EDU557N 455 REPETS=1
100	edu557	0.0	4	217.0	10.0	10.6			EDU557N 459 REPETS=1
101	edu557	0.0	6	217.0	20.0	40.6			EDU557N 463 REPETS=1
102	edu557	0.0	6	227.0	10.0	12.8			EDU557N 469 REPETS=1
103	edu557	0.0	5	227.0	20.0	44.8			EDU557N 475 REPETS=1
104	edu557	1.0	1	227.0	20.0	44.8	0.0	0.0	EDU557N 475 REPETS=1
105	edu557	0.0	1	227.0	25.0	58.8			EDU557N 481 REPETS=1
106	edu557	1.0	1	227.0	25.0	58.8	83.8	204.0	EDU557N 481 REPETS=1
107	edu557	0.0	3	227.0	25.0	64.8			EDU557N 483 REPETS=1
108	edu557	1.0	1	227.0	25.0	64.8	120.0	390.0	EDU557N 483 REPETS=1
109	edu557	0.0	4	227.0	25.0	88.8			EDU557N 487 REPETS=1
110	edu557	1.0	1	227.0	25.0	88.8	233.8	819.0	EDU557N 487 REPETS=1
111	edu557	1.0	1	227.0	25.0	88.8	25.0	189.0	EDU557N 487 REPETS=1
112	edu557	0.0	6	227.0	25.0	74.8			EDU557N 493 REPETS=1
113	edu557	0.0	6	237.0	10.0	14.0			EDU557N 499 REPETS=1
114	edu557	0.0	6	237.0	15.0	31.0			EDU557N 505 REPETS=1
115	edu557	0.0	2	237.0	20.0	49.0			EDU557N 511 REPETS=1
116	edu557	0.0	4	237.0	25.0	67.0			EDU557N 513 REPETS=1
117	edu557	0.0	4	247.0	10.0	16.1			EDU557N 517 REPETS=1
118	edu557	0.0	4	247.0	15.0	35.1			EDU557N 521 REPETS=1
119	edu557	0.0	2	247.0	40.0	163.1			EDU557N 525 REPETS=1
120	edu557	0.0	1	267.0	20.0	60.5			EDU557N 527 REPETS=1
121	edu557	1.0	1	267.0	20.0	60.5	20.0	155.5	EDU557N 527 REPETS=1
122	edu557	0.0	2	267.0	20.0	64.5			EDU557N 529 REPETS=1
123	edu557	0.0	4	267.0	20.0	65.5			EDU557N 531 REPETS=1



124	edu557	0.0	4	277.0	15.0	45.6	EDU557N 535 REPETS= 1
125	edu557	0.0	4	277.0	25.0	97.6	EDU557N 539 REPETS= 1
126	edu557	0.0	1	287.0	30.0	143.8	EDU557N 543 REPETS= 1
127	edu557	1.0	1	287.0	30.0	143.8	EDU557N 543 REPETS= 1
128	edu557	1.0	1	287.0	30.0	144.8	EDU557N 545 REPETS= 1
129	edu557	1.0	1	287.0	30.0	144.8	EDU557N 545 REPETS= 1
130	edu557	0.0	3	287.0	30.0	162.8	EDU557N 547 REPETS= 1
131	edu557	1.0	1	287.0	30.0	162.8	EDU557N 547 REPETS= 1
132	edu557	0.0	6	287.0	30.0	162.8	EDU557N 551 REPETS= 1
133	edu557	0.0	4	297.0	5.0	10.9	EDU557N 557 REPETS= 1
134	edu557	0.0	4	297.0	10.0	29.0	EDU557N 561 REPETS= 1
135	edu557	0.0	4	297.0	20.0	81.0	EDU557N 565 REPETS= 1

## SECTION I: SINGLE AIR DIVES

### C. EDU885A

- 483 dives: 30 DCS 0 Marginal
- All dives were wet; water temperature ( $\pm 2^{\circ}\text{F}$ ) determined by length of the dive:
  - $\geq 250$  min  $65^{\circ}\text{F}$
  - 249-190 min  $60^{\circ}\text{F}$
  - 179-180 min  $55^{\circ}\text{F}$
  - $\leq 79$  min  $50^{\circ}\text{F}$
- Dives were performed during the period August - December 1984
- Exercise: intermittently at depth on a bicycle ergometer (75 watts) at 55-60 rpm
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations were provided in reference 1.

1. Thalmann, ED. Air-N<sub>2</sub>O<sub>2</sub> Decompression Computer Algorithm Development. NEDU Report No. 8-85. Navy Experimental Diving Unit, Panama City, FL. August 1986.

## SECTION I: SINGLE AIR DIVES

C. EDU885A

483 dives: 30 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
3	319.9	325.1	Type II (5 min to onset). Rt elbow pain & arm weakness, flexors & extensors; complete relief at 30 fsw on TT6
4	350.1	440.1	Type I (2 h to onset). Knee pain; initially abated; recurred 3 hrs post dive in hot shower; complete relief on arrival at 60 fsw; TT5
7	456.0	756.0	Type I (7 h to onset). Left knee pain, very mild; fatigue. Complete relief at 40 fsw on TT5
13	165.5	275.0	Type I (1 h to onset). Rt index finger, pain & stiffness; first noted 30 min before completing 20 fsw stop, increased in intensity 1 hr into 10 fsw stop; complete relief on arrival at 60 fsw TT6
14	475.0	775.0	Type II (7 h to onset). Rt lateral leg & thigh pain & paresthesias; did not report for treatment until 17 hrs post dive. Complete relief 30 min after arrival at 60 fsw; TT6 w/ 1 ext at 60 fsw
15	475.0	1495.0	Type I (19 h to onset). Rt medial foot pain; severe enough to cause limping; complete relief upon arrival at 60 fsw; TT6
18	374.0	554.0	Type I. Bilateral hip pain; knee pain, mottling & itching of abdomen; complete relief after 4 min @ 60 fsw; TT5; hip pain recurred next day; complete relief after 6 min @ 60 fsw; TT5
19	374.0	524.0	Type I (4.5 h to onset). Right shoulder pain; fatigue. Complete relief upon arrival at 60 fsw. TT5
20	182.2	494.0	Type I (4 h to onset). Right shoulder pain at 60 fsw; Left knee pain 4 hrs post dive Pulled shoulder on bottom. Mild pain on surfacing which increased over next 4 hours at which time knee pain developed. Complete relief after 7 min @ 60 fsw, TT5.
22	203.6	293.6	Type I (-0.2 min to onset). Left hip/groin pain (mild) at the 10' stop; left hip pain did not change w/surfacing; complete relief @ 60 fsw, TT5. Right shoulder pain (13 hrs post dive; 10 hrs post treatment); woke diver but relieved by change in position. 16 hrs post dive right arm paresthesias & swollen feeling of right hand with decreased manual dexterity. Compressed to 60 fsw with 50% relief of pain and 100% relief of paresthesia. Slight residual shoulder soreness after 1 ext of TT6 at 60 fsw. Recurrence of shoulder pain at 52 fsw on decompression. Near complete resolution on recompression to 60 fsw w/mild residual soreness after 3 more O <sub>2</sub> periods. Shoulder pain increased w/radiation to elbow w/paresthesias on travel to 30 fsw. Substantial relief on compression to 60 fsw but mild residual soreness remained. Compressed to 100 fsw on 40% O <sub>2</sub> /N <sub>2</sub> w/complete relief. After 25 min decompressed to 60 fsw @ 1 fsw/min; 2 O <sub>2</sub> periods @ 60 fsw, decompressed on TT6. Slight pain recurrence at 35 fsw which disappeared after 5 min on O <sub>2</sub> . On surfacing only had signs of pulmonary O <sub>2</sub> toxicity; 3 days later developed right shoulder pain & mild arm & hand paresthesias. Diver was pianist & noted decreased right hand dexterity on playing but was normal on physical exam. Also had leg pain. Substantial improvement with TT5; 3 days later (09/13/84) received another TT5 because of decreased manual dexterity and right shoulder & elbow pain. Given 5 more treatments over the next 8 days, some to 165 fsw. All treatments gave some relief & although symptoms returned between treatments, they did not return to pre-treatment intensity. Motrin on 09/18; last treatment on 09/21 followed by 1 month hiatus. At that time shoulder & elbow pain recurred after softball & basketball games. Had 3 TT6 treatments over 4 days with no further improvement after 3rd treatment. At this time diagnosis of ulnar neuritis secondary to DCS was made. Improved over next 3 months with manual dexterity returning to normal, arm and elbow aching occurred with exposure to cold, but symptoms barely noticeable. On 01/13/85 participated in 5 day 60 fsw air saturation dive - completely asymptomatic before & after this dive.
23	323.8	444.0	Type I (2.5 h to onset). Right shoulder pain; complete relief after one O <sub>2</sub> period at 60 fsw; TT6.
24	323.8	474.0	Type II (3 h to onset). Extreme fatigue followed by nausea and bilateral lower extremity paresthesias; nausea gone after 5 min at 60 fsw. Complete relief after 2nd O <sub>2</sub> period. TT6 with 1 extension at 60 fsw.

24	323.8	474.0	Type I (3 h to onset). Right shoulder pain. Complete relief upon arrival at 60 fsw, TT6.
27	64.0	154.1	Type I (-0.2 min to onset). Left shoulder pain (mild) at 10' stop; first noted at depth. Increased over 40 min post-dive. Complete relief upon arrival at 60 fsw, TT6
34	254.0	434.0	Type I (5 h to onset). Right knee pain. Reported for treatment 15 hrs post dive. Complete relief after 3rd O <sub>2</sub> period at 60 fsw, TT6 with 1 ext at 60 fsw.
38	259.0	559.0	Type I (7 h to onset). Shoulder pain. Complete relief on compression to 60 fsw; TT5.
47	311.5	461.0	Type I (3 h to onset). Right knee ache (initially fleeting); right shoulder pain. Complete relief of knee pain on compression to 60 fsw; 50% relief of shoulder symptoms after 3rd O <sub>2</sub> period. TT6 with 2 ext at 60 fsw.
48	401.0	521.0	Type I (4 h to onset). Ankle pain. Complete relief after 3 O <sub>2</sub> periods at 60 fsw. TT6 with 1 ext at 60 fsw.
56	470.0	770.0	Type I (7 h to onset). Right knee pain. Substantial relief upon arrival at 60 fsw. Complete relief by 2nd O <sub>2</sub> period. TT6. Recurred at 45 fsw during ascent, recompressed to 60 fsw. Complete relief by 2nd O <sub>2</sub> period. TT6 with 1 ext at 30 fsw.
57	470.0	2680.0	Type II. Onset time 40 hrs - post dive fatigue, memory lapses, left knee pain. Decreased sensation to pinprick right temple and right trunk. Decreased grip strength, decreased neuropsychological function of Trails A, Symbol Digit Modality Test and Wechsler memory test. Knee pain gone upon arrival at 60 fsw. Complete relief all symptoms after 3rd O <sub>2</sub> period. All neuropsychological tests WNL at 60 fsw except for SDMT which improved but not WNL. TT6 with 2 ext at 60 fsw and 1 ext at 30 fsw. Onset time 96 hrs - difficulty remembering and concentrating. Low score on Thurston Test of Mental Alertness. Flat affect. Given TT6, TTMA & affect normal after treatment. 48 hrs after treatment still complained of poor concentration. Subjective improvement after completion of another TT6.
60	72.9	287.6	Type I (2 min to onset) - left knee pain first noted at depth but went away; recurred 2 min post dive. Pain 80% gone on arrival at 60 fsw. Complete relief at 30 fsw after 1 ext at 60 fsw. TT6
61	406.0	1246.0	Type II - decreased sensation over right knee Type I (16 h to onset). Left elbow pain; complete relief at 30 fsw during compression. TT5
64	242.0	362.0	Type I (2.5 h to onset). Right shoulder & arm pain; pain mild at first, increased in intensity over next several hours. Reported for treatment 5 hrs post dive. Shoulder pain gone on arrival at 60 fsw. Arm pain gone after 3rd O <sub>2</sub> period. TT6 with 1 ext at 60 fsw.
67	88.0	146.7	Type I (immediate onset). Right shoulder pain & mild sensation of arm heaviness at 10' stop; sensation began just before surfacing. Complete relief upon arrival at 60 fsw TT?
73	65.9	155.7	Type I (20 min to onset). Right knee pain, 70' 1st dive. First noted on ascent from first dive. Increased slightly at 20 FSW, plateaued at 10 FSW. Increased over first 20 min after surfacing. Complete relief at 20 FSW on compression. TT5.
75	47.4	77.4	Type I (40 min to onset). 40 min after 1st dive, left hip and shoulder, right elbow pain; complete relief at 50 fsw on compression. TT5
77	33.2	42.2	Type I (5 min to onset). 5 min 1st dive, left shoulder ache; pain mild at first, increased in intensity over next 40 min; complete relief after 10 min at 60 fsw. TT5
78	33.2	62.2	Type I (25 min to onset). 5 min 1st dive; left thumb pain, MCP joint; resolved after 5 min then recurred 20 min later and increased in intensity. Complete relief 10 min at 60 fsw. TT5
79	33.2	77.2	Type I (40 min to onset). 40 min 1st dive; left elbow pain; pain initially present immediately after 1st dive but resolved in a few minutes. Recurred and persisted 40 min later. Complete relief on arrival at 60 fsw. TT5
80	459.0	1299.0	Type I (16 h to onset). Left shoulder pain. Reported for treatment 16 hrs post dive. Complete relief at 14 fsw on compression. TT5. Shoulder pain recurred next day (12/01) along with paresthesias and pain in right hip. Complete relief of pain upon arrival at 60 fsw. TT6 extended 2 O <sub>2</sub> periods at 60 fsw. Paresthesias 95% relief upon leaving 60 fsw. Paresthesias increased after first air break at 30 fsw. Recompressed to 60 fsw with almost complete relief after 1st O <sub>2</sub> period. Completed another TT6 with complete relief upon surfacing.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU885A	0.0	10	100.0	63.5	97.0			AN1001.OUT 1 REPETS=2
2	EDU885A	0.0	10	100.0	61.5	96.7			AN1002.OUT 11 REPETS=1
3	EDU885A	1.0	1	150.0	59.6	260.5	319.9	325.1	AN1003.OUT 21 REPETS=1
4	EDU885A	1.0	1	150.0	59.6	260.5	350.1	440.1	AN1003.OUT 22 REPETS=1
5	EDU885A	0.0	8	150.0	59.6	260.5			AN1003.OUT 23 REPETS=1
6	EDU885A	0.0	10	100.0	62.5	94.3			AN1004.OUT 31 REPETS=1
7	EDU885A	1.0	1	60.0	182.6	153.8	456.0	756.0	AN1005.OUT 41 REPETS=1
8	EDU885A	0.0	9	60.0	182.6	153.8			AN1005.OUT 42 REPETS=1
9	EDU885A	0.0	10	60.0	183.3	153.2			AN1006.OUT 51 REPETS=1
10	EDU885A	0.0	9	100.0	66.8	59.0			AN1007.OUT 61 REPETS=1
11	EDU885A	0.0	9	60.0	94.3	15.9			AN1008.OUT 70 REPETS=1
12	EDU885A	0.0	10	100.0	63.1	58.5			AN1009.OUT 79 REPETS=1
13	EDU885A	1.0	1	150.0	64.0	151.3	165.5	275.0	AN1010.OUT 89 REPETS=1
14	EDU885A	1.0	1	150.0	64.0	151.3	475.0	775.0	AN1010.OUT 90 REPETS=2
15	EDU885A	1.0	1	150.0	64.0	151.3	475.0	1495.0	AN1010.OUT 91 REPETS=2
16	EDU885A	0.0	7	150.0	64.0	151.3			AN1010.OUT 92 REPETS=2
17	EDU885A	0.0	10	100.0	62.6	59.3			AN1011.OUT 99 REPETS=1
18	EDU885A	1.0	1	60.0	182.2	71.9	374.0	554.0	AN1012.OUT 109 REPETS=1
19	EDU885A	1.0	1	60.0	182.2	71.9	374.0	524.0	AN1012.OUT 110 REPETS=1
20	EDU885A	1.0	1	60.0	182.2	71.9	182.2	494.0	AN1012.OUT 111 REPETS=1
21	EDU885A	0.0	7	60.0	182.2	71.9			AN1012.OUT 112 REPETS=1
22	EDU885A	1.0	1	60.0	182.7	111.1	203.6	293.6	AN1013.OUT 119 REPETS=1
23	EDU885A	1.0	1	60.0	182.7	111.1	323.8	444.0	AN1013.OUT 120 REPETS=1
24	EDU885A	1.0	2	60.0	182.7	111.1	323.8	474.0	AN1013.OUT 121 REPETS=1

25	EDU885A	0.0	6	60.0	182.7	111.1			AN1013.OUT 123 REPETS=1
26	EDU885A	0.0	9	100.0	65.3	39.9			AN1014.OUT 129 REPETS=1
27	EDU885A	1.0	1	120.0	64.0	90.3	64.0	154.1	AN1015.OUT 138 REPETS=1
28	EDU885A	0.0	9	120.0	64.0	90.3			AN1015.OUT 139 REPETS=1
29	EDU885A	0.0	10	100.0	34.3	2.8			AN1016.OUT 148 REPETS=1
30	EDU885A	0.0	10	100.0	35.1	3.2			AN1017.OUT 158 REPETS=1
31	EDU885A	0.0	10	120.0	63.7	90.2			AN1018.OUT 168 REPETS=1
32	EDU885A	0.0	10	150.0	16.6	4.2			AN1019.OUT 178 REPETS=1
33	EDU885A	0.0	10	150.0	18.9	4.1			AN1020.OUT 188
34	EDU885A	1.0	1	150.0	45.3	88.9	254.0	434.0	AN1021.OUT 198 REPETS=1
35	EDU885A	0.0	9	150.0	45.3	88.9			AN1021.OUT 199 REPETS=1
36	EDU885A	0.0	10	150.0	44.2	88.9			AN1022.OUT 208 REPETS=1
37	EDU885A	0.0	9	60.0	68.0	2.3			AN1023.OUT 218 REPETS=1
38	EDU885A	1.0	1	150.0	50.5	88.7	259.0	559.0	AN1024.OUT 227
39	EDU885A	0.0	8	150.0	50.5	88.7			AN1024.OUT 228 REPETS=2
40	EDU885A	0.0	10	60.0	68.7	2.0			AN1025.OUT 236 REPETS=1
41	EDU885A	0.0	10	60.0	68.6	1.7			AN1026.OUT 246 REPETS=1
42	EDU885A	0.0	9	150.0	45.9	102.0			AN1027.OUT 256
43	EDU885A	0.0	9	150.0	44.8	100.5			AN1028.OUT 265
44	EDU885A	0.0	10	100.0	93.9	211.7			AN1029.OUT 274 REPETS=1
45	EDU885A	0.0	9	100.0	93.3	211.5			AN1030.OUT 284 REPETS=1
46	EDU885A	0.0	10	190.0	13.8	6.3			AN1031.OUT 293 REPETS=1
47	EDU885A	1.0	1	190.0	43.1	238.4	311.5	461.0	AN1032.OUT 303 REPETS=1
48	EDU885A	1.0	1	190.0	43.1	238.4	401.0	521.0	AN1032.OUT 304 REPETS=1
49	EDU885A	0.0	8	190.0	43.1	238.4			AN1032.OUT 305 REPETS=1
50	EDU885A	0.0	9	190.0	16.0	6.4			AN1033.OUT 313 REPETS=1
51	EDU885A	0.0	9	120.0	27.8	3.0			AN1034.OUT 322 REPETS=1
52	EDU885A	0.0	9	190.0	35.4	106.1			AN1035.OUT 331 REPETS=1
53	EDU885A	0.0	10	120.0	28.2	4.0			AN1036.OUT 340 REPETS=1
54	EDU885A	0.0	10	50.0	244.0	159.7			AN1037.OUT 350 REPETS=1

55	EDU885A	0.0	10	190.0	36.8	103.3				AN1038.OUT 360 REPETS=1
56	EDU885A	1.0	1	120.0	82.9	267.1	470.0	770.0		AN1039.OUT 370 REPETS=1
57	EDU885A	1.0	1	120.0	82.9	267.1	470.0	2680.0		AN1039.OUT 371 REPETS=1
58	EDU885A	0.0	8	120.0	82.9	267.1				AN1039.OUT 372 REPETS=1
59	EDU885A	0.0	10	60.0	129.1	57.5				AN1040.OUT 380 REPETS=1
60	EDU885A	1.0	1	120.0	72.9	212.7	72.9	287.6		AN1041.OUT 390 REPETS=1
61	EDU885A	1.0	1	120.0	72.9	212.7	406.0	1246.0		AN1041.OUT 391 REPETS=1
62	EDU885A	0.0	8	120.0	72.9	212.7				AN1041.OUT 392 REPETS=1
63	EDU885A	0.0	10	50.0	243.1	160.0				AN1042.OUT 400 REPETS=1
64	EDU885A	1.0	1	120.0	63.2	148.8	242.0	362.0		AN1045.OUT 410 REPETS=1
65	EDU885A	0.0	9	120.0	63.2	148.8				AN1045.OUT 411 REPETS=1
66	EDU885A	0.0	8	60.0	124.4	58.8				AN1048.OUT 420 REPETS=1
67	EDU885A	1.0	1	150.0	42.6	104.1	88.0	146.7		AN2002.OUT 428 REPETS=1
68	EDU885A	0.0	9	150.0	42.6	104.1				AN2002.OUT 429 REPETS=1
69	EDU885A	0.0	9	120.0	64.2	154.1				AN2004.OUT 438 REPETS=1
70	EDU885A	0.0	10	120.0	63.3	153.4				AN2005.OUT 447 REPETS=1
71	EDU885A	0.0	1	150.0	44.0	97.9				AN2009.OUT 457 REPETS=1
72	EDU885A	0.0	1	100.0	62.1	59.8				AN2010.OUT 458 REPETS=1
73	EDU885A	1.0	1	100.0	65.9	69.8	65.9	155.7		AN2012.OUT 459 REPETS=1
74	EDU885A	0.0	1	100.0	65.9	69.8				AN2012.OUT 460 REPETS=1
75	EDU885A	1.0	1	100.0	33.7	3.7	47.4	77.4		AN2017.OUT 461 REPETS=1
76	EDU885A	0.0	8	80.0	123.6	215.7				AN2018.OUT 462 REPETS=1
77	EDU885A	1.0	1	100.0	33.2	4.0	33.2	42.2		AN2019.OUT 470 REPETS=1
78	EDU885A	1.0	1	100.0	33.2	4.0	33.2	62.2		AN2019.OUT 471 REPETS=1
79	EDU885A	1.0	1	100.0	33.2	4.0	33.2	77.2		AN2019.OUT 472 REPETS=1
80	EDU885A	1.0	1	80.0	123.0	216.1	459.0	1299.0		AN2020.OUT 473 REPETS=1
81	EDU885A	0.0	9	80.0	123.0	216.1				AN2020.OUT 474 REPETS=1
82	EDU885A	0.0	1	80.0	41.3	2.0				AN3008.OUT 483 REPETS=1

## **SECTION I: SINGLE AIR DIVES**

### **D. UPS290**

- 299 dives: 4 DCS, 0 Marginal
- All dives were wet; some were in open water, some were in escape chamber facilities. This data is from a review that covers many different escape trials.
- The period covered in this review report is 1945-1970
- Exercise: none
- This data set is included in the report, Statistically Based Decompression Tables I.
- Descriptions of DCS manifestations were taken from reference 1.

1. Donald, KW. A review of submarine escape trials from 1945-1970 with a particular emphasis on decompression sickness. Medical Research Council, Report #290, Royal Naval Personnel Research Committee, October 1970.



## SECTION I: SINGLE AIR DIVES

D: UPS290

299 Dives: 4 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
21	-1.2	120	Migraine reported 1.5 hours post-dive; diver did not have a history of migraine.
24	-1.5	12	... and another escape from 450 ft three weeks later. In this last escape he again developed Type II decompression sickness with 'heaviness' and parasthesiae affecting the left arm, buttock and thigh. His previous attack had been on the right side. Symptoms and signs (loss of knee bicipital reflexes) did not clear until he was compressed to 165 ft. on air. He made a complete recovery.
28	-1.7	9	One of the three subjects developed Type II decompression sickness (malaise, paresthesiae right arm, slurred speech, ataxia) which was rapidly cured by therapeutic recompression with air to 165 ft. This subject, who was the oldest member of the group and supervising officer, suffered a Type II bend after a chamber escape from 500 ft. The exposure was fairly severe. This officer had carried out four chamber escapes from 450 or 500 ft over a period of four weeks prior to the episode. After the event he carried out an escape from 450 ft. one week later, an escape from 450 ft three months later, and another escape from 450 ft three weeks later. (see profile #24)
47	0	0	One important incident occurred. The trials' officer suffered 'impairment of vision and balance' after an ascent from 505 ft. He made a rapid and complete recovery with recompression to 60 ft on oxygen. <i>Later in report</i> ..... The subject was, again, the supervising officer who had been exposed to high pressures a great deal. Further, he had carried out a considerable number of sea escapes in the previous few days. He was the oldest member of the group. He stated that he had suffered a not dissimilar attack (visual scotoma) while boxing some years before. He is a migrainous subject.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	ups290	0.0	1	200.0	3.2	0.7			UPS290 1 REPETS=1
2	ups290	0.0	1	200.0	4.1	0.7			UPS290 2 REPETS=1
3	ups290	0.0	1	200.0	3.8	0.8			UPS290 3 REPETS=1
4	ups290	0.0	1	200.0	3.9	0.8			UPS290 4 REPETS=1
5	ups290	0.0	1	200.0	3.5	0.7			UPS290 5 REPETS=1
6	ups290	0.0	1	300.0	3.1	1.1			UPS290 6 REPETS=1
7	ups290	0.0	24	200.0	2.6	0.7			UPS290 7 REPETS=1
8	ups290	0.0	8	200.0	2.5	1.5			UPS290 31 REPETS=1
9	ups290	0.0	3	200.0	2.2	3.1			UPS290 39 REPETS=1
10	ups290	0.0	2	300.0	2.7	1.3			UPS290 42 REPETS=1
11	ups290	0.0	5	300.0	2.7	2.4			UPS290 44 REPETS=1
12	ups290	0.0	2	330.0	2.3	1.4			UPS290 49 REPETS=1
13	ups290	0.0	6	125.0	0.7	1.0			UPS290 51 REPETS=1
14	ups290	0.0	2	175.0	0.9	1.5			UPS290 57 REPETS=1
15	ups290	0.0	4	225.0	0.8	1.9			UPS290 59 REPETS=1
16	ups290	0.0	26	60.0	0.9	0.2			UPS290 63 REPETS=1
17	ups290	0.0	12	160.0	1.1	0.5			UPS290 89 REPETS=1
18	ups290	0.0	12	240.0	1.3	0.8			UPS290 101 REPETS=1
19	ups290	0.0	10	300.0	1.0	1.0			UPS290 113 REPETS=1
20	ups290	0.0	16	350.0	1.0	1.2			UPS290 123 REPETS=1
21	ups290	1.0	1	350.0	1.0	1.2	1.0	122.2	UPS290 123 REPETS=1
22	ups290	0.0	10	400.0	1.0	1.3			UPS290 140 REPETS=1
23	ups290	0.0	3	450.0	0.7	1.5			UPS290 150 REPETS=1
24	ups290	1.0	1	450.0	0.7	1.5	0.7	14.2	UPS290 150 REPETS=1

25	ups290	0.0	19	450.0	0.8	1.5	UPS290 154 REPETS= 1
26	ups290	0.0	5	500.0	0.7	1.7	UPS290 173 REPETS= 1
27	ups290	0.0	2	500.0	0.8	1.7	UPS290 178 REPETS= 1
28	ups290	1.0	1	500.0	0.8	1.7	UPS290 178 REPETS= 1
29	ups290	0.0	10	180.0	0.3	0.4	UPS290 181 REPETS= 1
30	ups290	0.0	9	280.0	0.4	0.6	UPS290 191 REPETS= 1
31	ups290	0.0	10	350.0	0.4	0.7	UPS290 200 REPETS= 1
32	ups290	0.0	10	400.0	0.5	0.8	UPS290 210 REPETS= 1
33	ups290	0.0	9	460.0	0.5	1.0	UPS290 220 REPETS= 1
34	ups290	0.0	6	500.0	0.4	1.0	UPS290 229 REPETS= 1
35	ups290	0.0	6	550.0	0.4	1.1	UPS290 235 REPETS= 1
36	ups290	0.0	6	600.0	0.4	1.2	UPS290 241 REPETS= 1
37	ups290	0.0	6	625.0	0.4	1.2	UPS290 247 REPETS= 1
38	ups290	0.0	12	280.0	0.3	0.6	UPS290 253 REPETS= 1
39	ups290	0.0	3	330.0	0.3	0.7	UPS290 265 REPETS= 1
40	ups290	0.0	3	355.0	0.3	0.7	UPS290 268 REPETS= 1
41	ups290	0.0	3	380.0	0.3	0.8	UPS290 271 REPETS= 1
42	ups290	0.0	3	405.0	0.4	0.8	UPS290 274 REPETS= 1
43	ups290	0.0	3	430.0	0.4	0.8	UPS290 277 REPETS= 1
44	ups290	0.0	3	455.0	0.4	0.9	UPS290 280 REPETS= 1
45	ups290	0.0	3	480.0	0.4	0.9	UPS290 283 REPETS= 1
46	ups290	0.0	4	505.0	0.4	1.0	UPS290 286 REPETS= 1
47	ups290	1.0	1	505.0	0.4	1.0	UPS290 286 REPETS= 1
48	ups290	0.0	3	530.0	0.4	1.0	UPS290 291 REPETS= 1
49	ups290	0.0	3	555.0	0.4	1.1	UPS290 294 REPETS= 1
50	ups290	0.0	3	580.0	0.4	1.1	UPS290 297 REPETS= 1

## SECTION I: SINGLE AIR DIVES

### E. DC4W

- 244 dives: 8 DCS, 4 Marginal
- All dives were wet; water temperatures not reported in the references; may or may not be available in the original records
- Dives were conducted during the period 1978-1986
- Exercise consisted of: "wet divers took turns performing, as time permitted, an estimated 100 watts of work on a submerged exercise ergometer set at 50 watts (ref 2)
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of DCS manifestations were compiled from the reports referenced below and hand-written notes made from previous reviews made of the dive logs by P.K. Weathersby with numerous questions answered by R.Y. Nishi.

1. Nishi R.Y., KE Kisman, IP Buckingham, BC Eatock and G Masurel. XDC-2 digital decompression computer: assessment of decompression profiles by ultrasonic monitoring, Phase I: 36-54 msw. DCIEM Report 80-R-32, July 1980.
2. Nishi RY, BC Eatock, IC Buckingham and G Masurel. XDC-2 digital decompression computer: assessment of decompression profiles by ultrasonic monitoring, Phase II: 30-75 msw. DCIEM Report 81-R-02, January 1981.
3. Nishi, RY, BC Eatock, IP Buckingham and BA Ridgewell. Assessment of decompression profiles by ultrasonic monitoring. Phase III: No-decompression dives. DCIEM Report 82-R-38, August 1982.
4. Nishi, RY, KE Kisman, BC Eatock, TP Buckingham and G Masurel. Assessment of decompression profiles and divers by doppler ultrasonic monitoring. In: Proceedings VII Symposium on Underwater Physiology, AJ Bachrach and MM Matzen eds., 1982.
5. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F) DCIEM Report 84-R-72, Oct 1984.
6. Lauckner, GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series G-K) DCIEM Report 84-R-73, Nov. 1984.
7. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series L-Q) DCIEM Report 85-R-18, Apr 1985.

## SECTION I: SINGLE AIR DIVES

E. DC4W      244 dives: 8 DCS, 4 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
1	DCS	120.3	1080.3	Reported symptoms approx 18 hrs after surfacing; pain in right elbow, felt tired and dizzy and required treatment.
11	DCS	120.0	779.8	Pain in left leg "and other symptoms of Type II decompression sickness"; symptoms occurred approx 13 hrs after dive.
31	DCS	27.9	57.9	1 hour post dive, pain left shoulder and arm
32	Marginal	27.9	147.9	2.5 hours post dive, marbling right arm and shoulder; complete relief with 30 minutes surface O <sub>2</sub>
70	Marginal	-57.7	120.3	skin bend treated with surface oxygen
109	Marginal	86.9	236.9	4 hrs post dive experienced intense itching; suffered from cold stress, core temp decreased 1.5° C; possible Type I DCS
112	Marginal	116.9	356.8	6 hrs post dive after resting he felt faint and nauseous; cold stress during dive, core temp decreased by 1.5° C at 51 min into the dive; possible Type II DCS
124	DCS	116.9	266.6	Type I. 4.5 hours post dive, pain shoulder
127	DCS	-7.0	10.0	Type II DCS "soon after surfacing"; "did not seem to be a severe dive based on the bubble results of the other three subjects"; immediately post-dive, weak, faint, vertigo, difficulty breathing
128	DCS	116.9	717.2	Type I. 12 hours post dive, pain in right shoulder; 0530 following day (12 May 80) weakness and further pain in shoulder. treated on TT6
131	DCS	26.9	56.9	Type I. "bends about 1 hour post dive"
141	DCS	115.9	235.9	1 hour post dive, tingling fingers in left hand; 4 hours post dive, pain in left shoulder.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC4W	1.0	1	117.0	50.1	57.6	228.0	1188.0	DR0003A 1 REPETS=1
2	DC4W	0.0	1	117.0	50.1	57.6			DR0003A 2 REPETS=1
3	DC4W	0.0	2	118.0	40.1	41.4			DR0006A 3 REPETS=1
4	DC4W	0.0	2	117.0	40.1	43.3			DR0007A 5 REPETS=1
5	DC4W	0.0	2	117.0	30.1	31.4			DR0009A 7 REPETS=1
6	DC4W	0.0	2	117.0	30.0	33.5			DR0010A 9 REPETS=1
7	DC4W	0.0	2	147.0	20.1	29.9			DR0011A 11 REPETS=1
8	DC4W	0.0	2	148.0	30.1	50.4			DR0012A 13 REPETS=1
9	DC4W	0.0	2	147.0	25.1	37.1			DR0014A 15 REPETS=1
10	DC4W	0.0	2	148.0	25.0	38.8			DR0015A 17 REPETS=1
11	DC4W	1.0	1	148.0	30.0	47.2	197.2	857.0	DR0016A 19 REPETS=1
12	DC4W	0.0	1	148.0	30.0	47.2			DR0016A 20 REPETS=1
13	DC4W	0.0	2	177.0	15.0	32.0			DR0019A 21 REPETS=1
14	DC4W	0.0	2	177.0	20.0	40.0			DR0021A 23 REPETS=1
15	DC4W	0.0	2	177.0	20.0	42.0			DR0022A 25 REPETS=1
16	DC4W	0.0	2	177.0	25.0	55.7			DR0023A 27 REPETS=1
17	DC4W	0.0	2	177.0	25.0	56.0			DR0024A 29 REPETS=1
18	DC4W	0.0	2	177.0	15.0	32.6			DR0025A 31 REPETS=1
19	DC4W	0.0	2	217.0	10.0	31.0			DR0026A 33 REPETS=1
20	DC4W	0.0	2	216.0	10.1	30.9			DR0027A 35 REPETS=1
21	DC4W	0.0	2	246.0	10.0	38.2			DR0028A 37 REPETS=1
22	DC4W	0.0	2	245.0	8.8	34.0			DR0029A 39 REPETS=1
23	DC4W	0.0	2	217.0	15.0	45.1			DR0030A 41 REPETS=1
24	DC4W	0.0	2	217.0	15.0	44.0			DR0031A 43 REPETS=1
25	DC4W	0.0	2	98.0	55.0	41.0			DR0032A 45 REPETS=1

26	DC4W	0.0	2	97.0	55.1	41.7	DR0033A	47 REPETS=1
27	DC4W	0.0	2	176.0	20.1	42.7	DR0034A	49 REPETS=1
28	DC4W	0.0	2	176.0	25.0	57.5	DR0035A	51 REPETS=1
29	DC4W	0.0	2	97.0	82.0	57.1	DD1692A	53 REPETS=1
30	DC4W	0.0	2	148.0	51.0	79.1	DD1694A	55 REPETS=1
31	DC4W	1.0	1	198.0	36.0	71.1	DD1695A	57 REPETS=1
32	DC4W	0.5	1	198.0	36.0	71.1	DD1695A	58 REPETS=1
33	DC4W	0.0	2	99.0	35.0	22.1	DD1719A	59 REPETS=1
34	DC4W	0.0	2	99.0	34.0	21.1	DD1720A	61 REPETS=1
35	DC4W	0.0	1	183.0	19.0	30.6	DD1724A	63 REPETS=1
36	DC4W	0.0	2	168.0	16.0	18.1	DD1734A	64 REPETS=1
37	DC4W	0.0	2	168.0	16.0	19.1	DD1735A	66 REPETS=1
38	DC4W	0.0	2	168.0	16.0	14.1	DD1736A	68 REPETS=1
39	DC4W	0.0	2	168.0	17.0	14.1	DD1737A	70 REPETS=1
40	DC4W	0.0	2	168.0	16.0	17.1	DD1738A	72 REPETS=1
41	DC4W	0.0	2	178.0	21.0	31.1	DD1751A	74 REPETS=1
42	DC4W	0.0	2	178.0	19.0	27.1	DD1760A	76 REPETS=1
43	DC4W	0.0	2	178.0	21.0	28.1	DD1761A	78 REPETS=1
44	DC4W	0.0	2	98.0	20.0	9.1	DD1798A	80 REPETS=1
45	DC4W	0.0	2	98.0	20.0	9.1	DD1799A	82 REPETS=1
46	DC4W	0.0	2	173.0	20.0	28.1	DD1802A	84 REPETS=1
47	DC4W	0.0	2	173.0	20.0	28.1	DD1803A	86 REPETS=1
48	DC4W	0.0	2	172.0	21.0	29.1	DD1804A	88 REPETS=1
49	DC4W	0.0	1	173.0	19.0	22.1	DD1805A	90 REPETS=2
50	DC4W	0.0	2	198.0	17.0	28.1	DD1806A	91 REPETS=1
51	DC4W	0.0	2	198.0	18.0	31.1	DD1807A	93 REPETS=1
52	DC4W	0.0	1	198.0	21.0	36.1	DD1808A	95 REPETS=1
53	DC4W	0.0	2	198.0	18.0	31.1	DD1809A	96 REPETS=1
54	DC4W	0.0	2	167.0	21.0	25.1	DD1815A	98 REPETS=1
55	DC4W	0.0	1	177.0	16.0	19.1	DD1831A	100 REPETS=1

56	DC4W	0.0	2	166.0	16.0	16.1	DD1832A	101	REPETS=1
57	DC4W	0.0	2	198.0	16.0	26.1	DD1865A	103	REPETS=1
58	DC4W	0.0	2	168.0	16.0	18.1	DD1866A	105	REPETS=1
59	DC4W	0.0	2	167.0	16.0	18.1	DD1867A	107	REPETS=1
60	DC4W	0.0	2	166.0	16.0	19.1	DD1868A	109	REPETS=1
61	DC4W	0.0	1	198.0	15.0	20.1	DD1869A	111	REPETS=1
62	DC4W	0.0	1	118.0	25.0	20.9	DR0201A	112	REPETS=1
63	DC4W	0.0	2	148.0	20.0	24.9	DR0202A	113	REPETS=1
64	DC4W	0.0	1	59.0	80.0	11.1	DR0203A	115	REPETS=1
65	DC4W	0.0	2	89.0	40.0	17.1	DR0204A	116	REPETS=1
66	DC4W	0.0	1	118.0	25.0	19.2	DR0205A	118	REPETS=1
67	DC4W	0.0	1	148.0	20.0	24.6	DR0206A	119	REPETS=1
68	DC4W	0.0	2	177.0	15.0	25.1	DR0207A	120	REPETS=1
69	DC4W	0.0	2	118.0	50.0	69.6	DR0208A	122	REPETS=1
70	DC4W	0.5	1	148.0	30.0	57.7	DR0209A	124	REPETS=1
71	DC4W	0.0	1	148.0	30.0	57.7	DR0209A	125	REPETS=1
72	DC4W	0.0	1	170.0	25.0	66.5	DR0210A	126	REPETS=1
73	DC4W	0.0	1	119.0	50.0	71.0	DR0211A	127	REPETS=1
74	DC4W	0.0	1	177.0	21.0	52.0	DR0214A	128	REPETS=1
75	DC4W	0.0	2	177.0	30.0	89.5	DR0280A	129	REPETS=1
76	DC4W	0.0	2	177.0	30.0	86.2	DR0284A	131	REPETS=1
77	DC4W	0.0	2	49.0	100.0	6.0	DR0302A	133	REPETS=1
78	DC4W	0.0	2	89.0	60.0	42.5	DR0303A	135	REPETS=1
79	DC4W	0.0	2	89.0	60.0	41.5	DR0307A	137	REPETS=1
80	DC4W	0.0	2	148.0	40.0	84.6	DR0340A	139	REPETS=1
81	DC4W	0.0	2	108.0	10.0	3.3	DR0352A	141	REPETS=1
82	DC4W	0.0	2	118.0	50.0	68.3	DR0364A	143	REPETS=1
83	DC4W	0.0	1	148.0	40.0	81.4	DR0368A	145	REPETS=1
84	DC4W	0.0	1	148.0	15.0	17.5	DR0375A	146	REPETS=1
85	DC4W	0.0	1	97.0	36.0	13.5	DD1877A	147	REPETS=1



86	DC4W	0.0	1	98.0	35.5	13.7	DD1878A	148 REPETS= 1
87	DC4W	0.0	1	150.0	13.0	7.1	DD1883A	149 REPETS= 1
88	DC4W	0.0	1	57.0	46.0	4.3	DD1884A	150 REPETS= 1
89	DC4W	0.0	1	151.0	18.0	5.6	DD1892A	151 REPETS= 1
90	DC4W	0.0	2	98.0	22.0	9.6	DD1893A	152 REPETS= 1
91	DC4W	0.0	2	199.0	15.0	23.4	DD1894A	154 REPETS= 1
92	DC4W	0.0	2	199.0	15.0	24.6	DD1895A	156 REPETS= 1
93	DC4W	0.0	1	200.0	14.0	6.6	DD1896A	158 REPETS= 1
94	DC4W	0.0	1	231.0	11.0	7.0	DD1899A	159 REPETS= 1
95	DC4W	0.0	1	231.0	12.0	7.1	DD1900A	160 REPETS= 1
96	DC4W	0.0	1	231.0	11.9	7.0	DD1901A	161 REPETS= 1
97	DC4W	0.0	2	101.0	20.0	4.8	DD1902A	162 REPETS= 1
98	DC4W	0.0	2	101.0	27.0	4.8	DD1905A	164 REPETS= 1
99	DC4W	0.0	2	100.0	27.0	4.8	DD1906A	166 REPETS= 1
100	DC4W	0.0	2	100.0	34.0	4.8	DD1907A	168 REPETS= 1
101	DC4W	0.0	2	100.0	34.0	4.8	DD1908A	170 REPETS= 1
102	DC4W	0.0	2	149.0	17.3	5.6	DD1909A	172 REPETS= 1
103	DC4W	0.0	2	150.0	17.3	5.7	DD1910A	174 REPETS= 1
104	DC4W	0.0	2	150.0	21.5	5.6	DD1911A	176 REPETS= 1
105	DC4W	0.0	2	150.0	21.5	5.7	DD1912A	178 REPETS= 1
106	DC4W	0.0	2	200.0	16.0	6.6	DD1913A	180 REPETS= 1
107	DC4W	0.0	2	200.0	16.0	6.5	DD1914A	182 REPETS= 1
108	DC4W	0.0	2	68.0	46.0	4.2	DD1915A	184 REPETS= 1
109	DC4W	0.5	1	57.0	66.0	4.1	DD1916A	186 REPETS= 1
110	DC4W	0.0	1	57.0	66.0	4.1	DD1916A	187 REPETS= 1
111	DC4W	0.0	2	80.0	46.0	4.4	DD1917A	188 REPETS= 1
112	DC4W	0.5	1	65.0	66.0	4.2	DD1918A	190 REPETS= 1
113	DC4W	0.0	1	65.0	66.0	4.2	DD1918A	191 REPETS= 1
114	DC4W	0.0	2	64.0	66.0	4.2	DD1919A	192 REPETS= 1
115	DC4W	0.0	2	232.0	13.5	7.2	DD1920A	194 REPETS= 1

116	DC4W	0.0	2	232.0	13.5	7.1	DD1921A	196	REPETS=1
117	DC4W	0.0	2	232.0	13.5	7.2	DD1922A	198	REPETS=1
118	DC4W	0.0	2	265.0	11.5	7.7	DD1923A	200	REPETS=1
119	DC4W	0.0	2	265.0	11.5	7.7	DD1924A	202	REPETS=1
120	DC4W	0.0	2	150.0	22.0	5.6	DD1926A	204	REPETS=1
121	DC4W	0.0	2	150.0	22.0	5.5	DD1928A	206	REPETS=1
122	DC4W	0.0	4	149.0	21.5	5.6	DD1929A	208	REPETS=1
123	DC4W	0.0	2	150.0	20.2	5.6	DD1932A	212	REPETS=1
124	DC4W	1.0	1	198.0	15.0	6.4	DD1933A	214	REPETS=1
125	DC4W	0.0	1	198.0	15.0	6.4	DD1933A	215	REPETS=1
126	DC4W	0.0	2	198.0	15.0	6.6	DD1935A	216	REPETS=1
127	DC4W	1.0	1	231.0	12.8	7.0	DD1936A	218	REPETS=1
128	DC4W	1.0	1	231.0	12.8	7.0	DD1936A	219	REPETS=1
129	DC4W	0.0	2	179.0	20.0	24.1	DD1967A	220	REPETS=1
130	DC4W	0.0	1	178.0	21.0	36.0	DD1999A	222	REPETS=1
131	DC4W	1.0	1	168.0	16.0	21.1	DD2000A	223	REPETS=1
132	DC4W	0.0	1	168.0	16.0	21.1	DD2000A	224	REPETS=1
133	DC4W	0.0	2	167.0	16.0	21.1	DD2002A	225	REPETS=1
134	DC4W	0.0	2	98.0	24.0	13.3	DD2014A	227	REPETS=1
135	DC4W	0.0	2	99.0	24.0	13.5	DD2015A	229	REPETS=1
136	DC4W	0.0	2	183.0	15.0	18.6	DD2094A	231	REPETS=1
137	DC4W	0.0	1	98.0	20.0	9.1	DD2283A	233	REPETS=1
138	DC4W	0.0	2	103.0	16.0	6.0	DD2378A	234	REPETS=1
139	DC4W	0.0	3	100.0	18.0	9.3	DD2278A	236	REPETS=1
140	DC4W	0.0	3	100.0	13.0	5.3	DD2279A	239	REPETS=1
141	DC4W	1.0	1	148.0	51.0	77.1	DD1693A	242	REPETS=1
142	DC4W	0.0	1	148.0	51.0	77.1	DD1693A	243	REPETS=1
143	DC4W	0.0	1	198.0	21.0	26.1	DD1782A	244	REPETS=1

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## SECTION I: SINGLE AIR DIVES

### F. EDU1351NL

- 143 dives: 2 DCS, 7 Marginal
- All dives were wet; average water temperature was 66.9° F.
- Dives were conducted during the period 1945-46
- Exercise: all divers performed moderately heavy work at depth; "lifting and lowering a lead bucket, weighing 62 pounds underwater, to and from a submerged table 26 inches high." (ref 1)
- Manifestations are presented directly from the codes described in Table 1 of reference 1, as follows:
  - A - No symptoms
  - B - Skin itch on surface
  - B' - Skin itch at water stops
  - C - Moderate fatigue
  - D - Severe fatigue
  - E - Skin rash. Also includes the following other symptoms during the surface interval:
    - (a) Mild or transient pains
    - (b) Chest pains on deep inspiration (mild chokes)
    - (c) Paresthesias
  - F - Transient or mild pains not requiring recompression therapy
  - G - Other symptoms not requiring recompression therapy. Includes:
    - (a) Chest pains on deep inspiration (mild chokes)
    - (b) Muscle or joint stiffness with no pain present
    - (c) Paresthesias
    - (d) Vertigo
  - H - Permanent or severe pains requiring recompression therapy
  - I - Symptoms involving central nervous system. Includes:
    - (a) Visual disturbances
    - (b) Vertigo
    - (c) Paresthesias
    - (d) Paresis
    - (e) Paralysis
    - (f) Severe headache
  - J - Symptoms involving pulmonary system. Includes:
    - (a) Chokes
    - (b) Cyanosis
  - K - Other
- This data set is included in the report, Statistically Based Decompression Tables I.
- DCS events were diagnosed using the 1988 Weathersby et al criteria for diagnosis at NMRI on 17 December 1997 by CDR Charles Auker  
LCDR Chuck Toner  
LCDR Dan Valaik  
LT Tom Buttolph

1. Van Der Aue, OE, RJ Kellar, ES Brinton, et. al. Calculation and Testing of Decompression Tables for Air Dives Employing the Procedure of Surface Decompression and the Use of Oxygen. Experimental Diving Unit U.S. Naval Gun Factory Report No. 13-51. November 1951

# SECTION I: SINGLE AIR DIVES

F. EDU1351NL 143 dives: 2 DCS, 7 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
9	Marginal	0*	0*	Skin itch on surface; Transient or mild pains not requiring recompression therapy.
9	Marginal	0	0	Moderate fatigue; Transient or mild pains not requiring recompression therapy.
11	Marginal	0	0	Moderate fatigue; Transient or mild pains not requiring recompression therapy.
11	Marginal	0	0	Moderate fatigue; Transient or mild pains not requiring recompression therapy.
14	DCS	0	0	Moderate fatigue; Paresthesias
22	Marginal	0	0	Skin itch on surface; Severe fatigue
23	DCS	0	0	Skin itch on surface; Chest pains on deep inspiration (mild chokes)
40	Marginal	0	0	Skin itch on surface; Transient or mild pains not requiring recompression therapy.
43	Marginal	0	0	Transient or mild pains not requiring recompression therapy

\* T<sub>1</sub> and T<sub>2</sub> times were not available for this dataset and the descriptions in the report were not sufficient to calculate these times.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	edu1351nl	0.0	4	44.0	205.0	1.8			ed1351n.dat 1 REPETS=1
2	edu1351nl	0.0	4	54.0	105.0	2.2			ed1351n.dat 5 REPETS=1
3	edu1351nl	0.0	4	54.0	113.0	2.2			ed1351n.dat 9 REPETS=1
4	edu1351nl	0.0	4	64.0	73.0	2.6			ed1351n.dat 13 REPETS=1
5	edu1351nl	0.0	4	74.0	55.0	3.0			ed1351n.dat 17 REPETS=1
6	edu1351nl	0.0	4	84.0	44.0	3.4			ed1351n.dat 21 REPETS=1
7	edu1351nl	0.0	4	94.0	32.0	3.8			ed1351n.dat 25 REPETS=1
8	edu1351nl	0.0	2	94.0	34.0	3.8			ed1351n.dat 29 REPETS=1
9	edu1351nl	0.5	2	94.0	34.0	3.8	0.0	0.0	ed1351n.dat 29 REPETS=1
10	edu1351nl	0.0	6	94.0	35.0	3.8			ed1351n.dat 33 REPETS=1
11	edu1351nl	0.5	2	94.0	35.0	3.8	0.0	0.0	ed1351n.dat 33 REPETS=1
12	edu1351nl	0.0	4	94.0	36.0	3.8			ed1351n.dat 41 REPETS=1
13	edu1351nl	0.0	3	94.0	48.0	3.8			ed1351n.dat 45 REPETS=1
14	edu1351nl	1.0	1	94.0	48.0	3.8	0.0	0.0	ed1351n.dat 45 REPETS=1
15	edu1351nl	0.0	4	104.0	26.0	4.2			ed1351n.dat 45 REPETS=1
16	edu1351nl	0.0	4	104.0	28.0	4.2			ed1351n.dat 49 REPETS=1
17	edu1351nl	0.0	4	104.0	30.0	4.2			ed1351n.dat 53 REPETS=1
18	edu1351nl	0.0	4	104.0	40.0	4.2			ed1351n.dat 57 REPETS=1
19	edu1351nl	0.0	4	114.0	23.0	4.6			ed1351n.dat 61 REPETS=1
20	edu1351nl	0.0	4	114.0	25.0	4.6			ed1351n.dat 65 REPETS=1
21	edu1351nl	0.0	2	114.0	34.0	4.6			ed1351n.dat 69 REPETS=1
22	edu1351nl	0.5	1	114.0	34.0	4.6	0.0	0.0	ed1351n.dat 73 REPETS=1
23	edu1351nl	1.0	1	114.0	34.0	4.6	0.0	0.0	ed1351n.dat 73 REPETS=1
24	edu1351nl	0.0	2	124.0	18.0	5.0			ed1351n.dat 77 REPETS=1

25	edu1351nl	0.0	4	124.0	19.0	5.0	ed1351n.dat	79	REPETS=1
26	edu1351nl	0.0	4	124.0	21.0	5.0	ed1351n.dat	83	REPETS=1
27	edu1351nl	0.0	3	124.0	29.0	5.0	ed1351n.dat	87	REPETS=1
28	edu1351nl	0.0	4	134.0	16.0	5.4	ed1351n.dat	90	REPETS=1
29	edu1351nl	0.0	4	134.0	17.0	5.4	ed1351n.dat	94	REPETS=1
30	edu1351nl	0.0	4	134.0	24.0	5.4	ed1351n.dat	98	REPETS=1
31	edu1351nl	0.0	4	144.0	14.0	5.8	ed1351n.dat	102	REPETS=1
32	edu1351nl	0.0	4	144.0	15.0	5.8	ed1351n.dat	106	REPETS=1
33	edu1351nl	0.0	4	154.0	11.0	6.2	ed1351n.dat	110	REPETS=1
34	edu1351nl	0.0	4	154.0	13.0	6.2	ed1351n.dat	114	REPETS=1
35	edu1351nl	0.0	2	154.0	14.0	6.2	ed1351n.dat	118	REPETS=1
36	edu1351nl	0.0	4	164.0	9.0	6.6	ed1351n.dat	120	REPETS=1
37	edu1351nl	0.0	4	164.0	11.0	6.6	ed1351n.dat	124	REPETS=1
38	edu1351nl	0.0	4	174.0	7.0	7.0	ed1351n.dat	128	REPETS=1
39	edu1351nl	0.0	3	174.0	9.0	7.0	ed1351n.dat	132	REPETS=1
40	edu1351nl	0.5	1	174.0	9.0	7.0	ed1351n.dat	132	REPETS=1
41	edu1351nl	0.0	4	189.0	5.0	7.6	ed1351n.dat	136	REPETS=1
42	edu1351nl	0.0	3	189.0	7.0	7.6	ed1351n.dat	140	REPETS=1
43	edu1351nl	0.5	1	189.0	7.0	7.6	ed1351n.dat	140	REPETS=1

## SECTION I: SINGLE AIR DIVES

### G. EDU849LT2

- 141 dives: 26 DCS, 38 Marginal
- All were dry dives
- Dives were performed during the period May - September 1947
- Exercise: none during the dive. "On completion of the exposure period, they were decompressed to surface pressure in 4 minutes when half of them were immediately exercised for the next 2 hour period while the other half rested in bed." (ref 1). The exercised subjects incurred many more DCS cases than those on bed rest, but all are included in the data set.

*"The exercise prescribed consisted of lifting and returning a 25 pound dumbbell with both hands from a bench 12 inches high to arms length overhead at a rate of 4 times each minute for the entire two hour post dive period. The method of lifting this weight was alternated each minute to distribute the work load of different muscle groups. During one minute the weight was lifted by keeping the knees stiff, thus exercising chiefly the muscles of the back and upper extremity. During the alternate minute the weight was lifted and lowered by extending the flexing the knees from and to a squatting position, thus chiefly exercising the lower and upper extremities and keeping the back fairly erect."*

- Skin itch was not considered in the calculation of T-times
- This data set is included in the report, Statistically Based Decompression Tables I.
- Diagnoses of DCS were initially made by Dr. Van der Aue as seen in ref (1). With the additional information from the dive logs, re-diagnoses were made in March 1997 using the criteria established by Weathersby in 1988 (Appendix A). The re-diagnoses were made by collective decision of the following:

CDR Charles Auker MC USN  
LCDR Robert Ball MC USNR  
LCDR Charles Toner MC USN  
LCDR Daniel Valaik MC USN  
LT Thomas Buttolph MC USN  
Edward T. Flynn MD (MC USN RET)

- Complete descriptions of DCS manifestations were taken from the dive logs and cross referenced with the technical report (1).

1. Van Der Aue, O.E., R.J. Kellar, and E.S. Brinton. The Effect of Exercise During Decompression from Increased Barometric Pressures on the Incidence of Decompression Sickness in Man. Navy Experimental Diving Unit Report #8-49, March 1949.



## SECTION I: SINGLE AIR DIVES

G. EDU849LT2

141 dives: 26 DCS, 38 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Exercise Status	Signs & Symptoms
2	Marginal	30	120	rest	Intense skin itch - of face, neck, shoulders, and back. Chest and legs not involved. Began about 5 minutes post dive lasting about 45 mins. Itch began gradually, reached its peak about 20-25 mins post dive and then gradually subsided. Moderate fatigue - noticed about 2 hrs. post dive lasting remainder of day. No rash or pains or other symptoms.
3	Marginal	30	150	work	Mild skin itch over arms, back, neck and ears, none on abdomen chest or legs, beginning 10 min post dive lasting 20 min. No rash. No pains. Moderate post dive fatigue coming on about 2-3 hours after exercise and lasting remainder of day. Muscles of thighs felt sore from exercise effects toward evening and on following day. Twinges of sciatic pain from leg stretching noted toward evening and on following day. Comparison: He thinks the itch was more when resting after dive. Also thinks his fatigue was greater when resting after dive.
4	Marginal	30	120	work	Mild skin itch around ears, sides of neck, shoulders and upper arms beginning immediately post dive and lasting 15-20 mins. No rash. No pains. Moderate post dive fatigue - thinks fatigue was more from exercise effects. Immediately after exercise he felt weak in the knees and his thigh muscles quivered for about 1/2 hour. Was sore in the erector spini muscle groups from weight lifting for rest of the day. Comparison: itched more with rest after his dive. Fatigue was greater after working this may be have been due to the exercise effects.
5	Marginal	120	180	work	Severe skin itch over chest and back, mild itch on arms and forearms, none on face, legs or abdomen, beginning 5 mins post dive lasting 25 mins. No rash. No pains. Moderate severe fatigue noticed about 1 hr after exercise period - then remained mild for remainder of day. Thinks fatigue due to exercise since mild muscle soreness remained in inner sides of thighs and in small of back the following day. Comparison: rest caused itch of about same intensity but of larger duration. Work caused more fatigue but he thinks fatigue was due mostly to exercise done.
6	DCS	30	150	work	Bends. Moderate skin itch developed about 5 mins post dive over arms and upper back, none on face, neck, chest, abdomen or legs, which lasted about 25 min and disappeared. Completed 2 hr work dive with no further symptoms. Mild pain was noticed in his left shoulder near the acromioclavicular joint about 30 min after completing his exercise (2.5 hrs post dive). The pain remained constant, developing in intensity during the following 3 hrs becoming moderately severe and throbbing in character before recompression. No post dive fatigue was present. Rx - complete relief of pain at 40' (1442). Rx given at 1437 or 5 hrs and 40 min post dive. Brought out on Table 1 uneventfully. No return of pain, only residual stiffness in shoulder joint afterward. Symptom free following morning (surface reached at 1706). Comparison: skin itch was slightly worse with the rest dive - in that it was slightly more intense, slightly greater distribution and lasted slightly longer. No pains after rest dive - Bends from work dive. Note: subject painted his kitchen walls for about 4 hours on nite before his dive but used his right arm. Question if prediver fatigue as etiological factor in this case is doubtful. Left arm was not used during the painting.

8	Marginal	30	120	work	Very mild skin itch over ears and eyes, fleeting itch over arms and legs, none on body, coming on 5 mins post dive lasting 10 mins - less itch than 40 minute dives of 5/26 and 5/29. No rash. No pains. Moderate fatigue about 2 hrs. post dive lasting about 4 hours. Slight muscle soreness in anterior thigh muscles noticed following morning presumably from the effects of exercise.
9	Marginal	120	240	work	Mild skin itch over both forearms and left shoulder coming on 5 min post dive and lasting 15 min (less itch than 40 min dives). No rash. No pains. Moderate post dive fatigue coming on about 4 hr post dive and lasting remainder of day (fatigue greater than previous 40 min dives). No muscular soreness noted after this dive as was noted following 40 min work dive.
10	Marginal	10	28	work	Mild Bends. Very mild skin itch over forearms, thighs and a little over ears coming on 7 min post dive and lasting 10 min. Not as severe as after his 40 min work dive which was also very mild. No rash. Subject noticed a dull pain in his right acromioclavicular joint about 28 min post dive which lasted only about 5 min and then disappeared without recurrence. Does not think it was sprained or injured in any way. No other pains. Mild fatigue noticed about 2 hrs post dive (on completion of exercise) lasting remainder of day. Only slight soreness across small of back (less than after his 40 min work dive) noticed on following morning probably exercise effects.
12	Marginal	0	20	work	Mild Bends. Very mild itch over upper back and same on wrists beginning 5 min post dive lasting only 5 min. No rash. Slight soreness was noticed in his right shoulder joint about 20 min post dive while at work and remained about 20 mins. He states it felt like a bruise or a "black-n-blue" spot. No soreness while at rest but sore only on movement of joint or by squeezing the tissues by his hand. No fatigue.
13	Marginal	10	30	work	(borderline) Mild skin itch both forearms and upper back coming on 5 min post dive lasting about 10-15 mins. No rash. Muscles in left side of neck down to left shoulder felt stiff about 1/2 hour post dive lasting about 10 min. No pain. Mild fatigue noticed about 7 hrs post dive lasting 3-4 hrs. Weakness and a "funny feeling" in and around his left knee noticed about 6 hrs post dive lasting only about 1/2 hour.
14	Marginal	30	150	rest	(borderline) Mild skin itch over forearms, sides of neck and upper back noticed about 2-3 mins post dive lasting 10-15 mins. No rash. No pains. Moderate fatigue noticed about 2.5 hrs post dive an lasting to about 8 p.m. Following morning said his left knee felt "jumpy", no pains but more of a weakness. This lasted to about 12 noon and no further symptoms were noted. Comparison: Work dive slightly less itch. Work dive less fatigue. Stiffness of neck muscle with Work dive but not with Rest.
15	DCS	10	45	work	Mild Bends. Very mild itch over forearms noticed 5 min post dive lasting 10 min. No rash. Slight pain noticed in right elbow & shoulder about 3/4 hr post dive while working. Pain was dull & constant and remained to about 4 hrs post dive, finally disappearing. Mild fatigue noticed immediately after work period, lasting to about 2 PM (5 hr post dive). Thinks fatigue was from exercise. Comparison: Work less itch. Work slight pains. Work more fatigue.
17	Marginal	120	210	work	Moderate skin itch over face, neck ears, forearms and upper back and anterior aspects of thighs. Onset 5 min post dive lasting 15 min. No rash. No pains. Moderate fatigue noted about 3.5 hrs post dive lasting remainder of day. Back muscles (erector-spini muscle group) were sore about 1500 (6 hrs post dive) lasting remainder of day and the following day. He thinks this due to a back sprain incurred during exercise. Comparison: work -- more itch - greater intensity, greater distribution, greater duration. work -- more fatigue - none after rest.
18	Marginal	120	180	work	Moderate skin itch immediately on reaching surface over ears, face, forearms - lasted ~ 15 min. No rash. No pains. Moderate fatigue - coming on about 3 hrs post dive and lasting remainder of day and nite. OK following day. Compare: work -- more itch, greater intensity/distribution/duration; work - more fatigue, none after rest.
19	Marginal	10	120	work	Mild itch over forearms, upper back and anterior thighs beginning 5 min post dive and lasting about 35 min. No rash. No pains. Moderate fatigue noted toward end of 2 hour working period disappearing at about 1230 (3.5 hrs post dive). Thinks fatigue was due to exercise effects. Felt well following day. Comparison: post dive itch about the same for work or rest. Work -- more fatigue - thinks due to exercise effects. Work -- no pains - rest - bends.

20	DCS	120	540	work	(questionable borderline) Severe skin itch over upper back, shoulders, arms and neck. Began 2 min post dive lasting 20 min. No rash. No pains on day of dive. Moderately severe fatigue - noticed about 1800 ( 9 hrs post dive) was so tired he retired at 1900. Awoke on following morning with an ache in right knee with a feeling of stiffness. When he rests or don't use ( <i>sic</i> ) legs he feels O.K. On putting strain on knee, the dull ache is noted. Comparison: work -- more itch (greater intensity, distribution about the same, lesser duration). Work -- pains in right knee following morning. No pains on Rest. Work -- more fatigue - none with Rest.
21	DCS	10	30	work	Mild Bends. Mild skin itch over arms, shoulders, upper chest and over calves of legs beginning 6 min post dive lasting 25 min. No rash. Noticed dull intermittent pain in his right armpit about 30 min post dive which traveled to his right shoulder, remained about 15 min and then disappeared. 45 min post dive (as soon as pain left right shoulder) an inconstant pain was noted in his right elbow, coming on at about 30 min intervals and lasting 10-15 min. This continued to about 1400 (3/4 hrs post dive to 5 hrs post dive). The pain was throbbing in character at times. About 8 hrs post dive the intermittent pains reappeared in the right elbow and remained to about 10 p.m. (13 hrs post dive) when they finally disappeared without recurrence. No post dive fatigue. Felt well following morning.
22	DCS	30	180	rest	Bends. Mild itch over forearms and little over anterior thighs. Onset 5 min post dive lasting 30-35 min. No rash. Noticed a dull pain develop in his right knee just outside and below the knee cap, about 1230 (about 3 hrs post dive). This remained constant and lasted for 2 hrs until recompression was given at 1438 (about 5 hrs post dive). Very mild post dive fatigue. Treatment: recompression begun at 1438 (5 h 18 min post-dive), partial relief at 20' complete relief at 25' which was reached at 1422. Taken to 100' at 1442 and out on Table I using O <sub>2</sub> , reaching surface symptom free at 1703. No further symptoms during treatment or following thereafter.
23	DCS	10	60	work	Mild Bends. Moderately severe skin itch over arms, shoulders, chest, upper back, nape of neck and ears. Mild itch over thighs. Began about 3 min post dive and lasted about 30 min. No rash. Had intermittent mild dull pains in mid-portion of right forearm noticed about 1 hr post dive and lasting about 2 hrs. finally disappearing without recurrence. Severe post dive fatigue noticed about 3 hrs after his dive and lasting to about 1700 (10 hrs post dive).
24	DCS	120	1260	work	(questionable borderline ??) Mild skin itch over face, ears, neck and hands beginning 5 min post dive lasting 25 min. Very mild itch over cheek beginning 10 min post dive lasting 20 min. No rash. No pains on day of dive. However on arising the following morning he noticed slight pain in left ankle This remained throughout the day when it disappeared about 1900 of that day. No history of sprain or other injury. Questionable etiology. No post dive fatigue on day of dive or following day.
26	Marginal	10	60	rest	Mild Bends. Moderate skin itch of face, chest, upper back, arms, forearms, thighs and legs. Came on 4 min post dive lasting about 5 min, No rash. Dull pains of short duration noted in: left knee - about 1 hr post dive lasting 1 min & disappearing left elbow - about 1.5 hr post dive lasting 1 min & disappearing right instep - about 2 hrs post dive, lasting 1 min & disappearing No recurrence of above pains. No other pains. Mild post dive fatigue noticed immediately post dive and lasting to about 1800.
27	DCS	30	105	work	Comparison: itch - itch of same intensity, lesser distribution about of longer duration with work. Diver states itch in general was less with work. pains - mild bends in both dives. work: caused pains in left elbow only for 1 min. rest: caused pains in left elbow, left knee and right instep for about 1 min. Fatigue - more fatigue with rest. Bends. Moderate skin itch involving face, neck, shoulders, chest, upper back, upper extremities, and both thighs, beginning 5 mins post dive and lasting 20 mins. No rash. Developed a dull pain in his right deltoid muscle about 1 3/4 hrs post dive which remained constant and grew progressively worse until 3 hrs post dive it seemed to settle in his right shoulder joint and became more severe in intensity. He was recompressed at 1228 (3 hrs post dive), relief was obtained at 30 feet which was reached at 1232.

27 (cont)					Taken to 100 ft at 1234 and brought out on Table I at 1455. Felt well after treatment, no recurrence of pain. Mild fatigue persisted for about 6 hrs after treatment. Following a.m. he felt well but on arising, he noticed some stiffness in his right knee. Says it felt as though he had hit his knee against something. He believes this stiffness was probably due to strain on the knee joint during the exercise which he was not accustomed to. Stiffness remained throughout the day. Next day he was O.K.
28	DCS	30	150	work	Mild bends. Mild skin itch was present over face, chest and upper back beginning about 3-4 min post dive and lasting about 30 min. No rash. A dull ache was noticed in his left hip about 1200 (2.5 hrs post dive) which disappeared about 1230. At 1400 the dull pain reappeared and remained in his hip about 3 hrs (1700) when it finally disappeared without further recurrence. Mild fatigue was noticed about 1 hr post dive and lasted to about 2000 (10.5 hr post dive). Following a.m. he awoke with same stiffness in his right knee with "popping" or bending knee. No actual pain or soreness. This remained for 2 days afterward.
29	Marginal	120	360	work	Mild Bends - (borderline?) Mild skin itch over shoulders and calves of legs, beginning 3-4 min post dive and lasting about 10 mins. No rash. Noticed a dull ache with stiffness in his right wrist about 11 p.m. (14 hrs post dive) which he noticed for about 20 minutes and then disappeared before retiring. Also had some stiffness of his knees and lower back about 10 p.m. (13 hrs post dive) which remained until he retired. Following a.m. his shoulders felt stiff. He believes the stiffness was probably due to the effects of exercise alone. Moderate fatigue noticed about 3 p.m. (6 hrs post dive) which lasted remainder of day to bed time. Thinks fatigue due to unaccustomed exercise. Comparison: work - less intense itch, lesser duration, lesser distribution. Work - mild dull ache in wrists 14 hrs post dive. No pains with Rest. Work - more fatigue. None with rest.
30	Marginal	30	120	work	Mild Bends. Severe skin itch over neck, shoulders, upper back, chest arms and forearms. None on face or below waist. Onset 2 min post dive lasting 25 mins. No rash. Sharp sudden twinge of pain in left wrist noticed about 3 hrs post dive lasting only about 1 min and disappeared without recurrence. No other pains. Severe fatigue about 2 hrs post dive lasting to bedtime (2200); states he was about as tired as he ever has been.
31	Marginal	30	120	work	Mild bends. Severe skin itch over shoulders, upper back, chest, arms and forearms, coming on about 5 mins post dive and lasting 30 minutes. No itch on face or below waist line except a very slight itch over both calves, lasting about 5 mins. No rash. A sharp twinge of pain developed in his left hand in two places. About 2.5 hrs post dive there was a pain in his 1st metatarsophalangeal joint which lasted about 1-2 mins. disappearing without recurrence and then about 5 min later, another pain occurred in the 3rd proximal interphalangeal joint which lasted for 1-2 min and disappeared. No recurrence of either of these pains. No other pains. Severe fatigue noticed about 2 hrs post dive and lasting remainder of day until bed time.
33	Marginal	120	180	rest	Severe skin itch - 2 mins post dive lasting about 40 mins. Generalized except hands and feet. No rash. No pains. Moderate fatigue noticed about 3 hrs post dive and lasting remainder of day.
34	Marginal	120	300	work	Moderate skin itch over face, neck, shoulders, chest, upper back, arms and forearms. None below waist. Began 4 mins post dive lasted about 20 mins. No rash. No pains. Moderate fatigue noticed about 5 hrs post dive lasting remainder of day to bed time (2030)
35	Marginal	30	120	rest	Severe skin itch involving ears, shoulders, back, arms, forearms, abdomen and lower legs. Began 2 min post dive and lasted about 10-15 mins. No rash. No pains. Moderate fatigue noticed about 2 hrs post dive and lasting to about 4 p.m. (7.5 hrs post dive)
36	DCS	30	120	rest	Mild Bends. Severe skin itch generalized over entire body coming on immediately post dive lasting about 30 mins. Dull aches were noticed in: 1. Distal interphalangeal joint left thumb. Noticed about 2 hrs post dive lasting about 3 mins and disappearing without further recurrence.

36 (cont)					<p>2. Right knee noticed about 2 hrs post dive lasting about 15 mins and disappearing without further recurrence.</p> <p>3. Left instep, noticed about 2 hrs post dive lasting about 20 mins and disappearing without further recurrence.</p> <p>4. Left knee noticed about 9 hrs post dive lasting about 1 hr and disappearing without further recurrence. Moderate fatigue and feeling of being "dopey" noticed about 8 hrs post dive lasting remainder of day until retiring. No complaints following a.m.</p>					
37	DCS	-6	5	rest	<p>Mild Bends. Severe skin itch over face, neck arms forearms and thighs. Began 3-4 min post dive and lasted about 15 mins. No rash. Developed a sharp pain in the distal inter-phalangeal joint of his left little fingers about 5 mins post dive. This remained sharp for about 1.5 hrs then subsided to a dull ache up to about 5 p.m. (about 9 hrs post dive) when it was hardly noticeable and did not completely disappear until 9 p.m. (about 13 hrs post dive). Also noticed a dull ache in the metatarsophalangeal joint of his left thumb about 5 mins post dive which lasted about 1 hr and disappeared without recurrence. No fatigue.</p>					
38	Marginal	30	180	work	<p>Mild Bends. Very severe skin itch accompanied by a feeling of burning in the skin involving the ears, neck, shoulders, arms, forearms, upper back and chest. Began about 2 mins post dive and lasted about 20 mins. Mild skin rash over both shoulders (deltoid area) noticed about 45 mins post dive which remained for about 1 hr and disappeared. Mild dull ache noticed in his right forearm just medial to wrist noticed about 3 hrs post dive and intermittently lasting for about 5 mins. Moderate fatigue noticed about 2 hrs post dive lasting remainder of the day.</p>					
39	Marginal	10	60	work	<p>Mild Bends. Moderate skin itch of shoulders, arms, forearms and upper back noticed 4 mins post dive and lasting about 20 mins. No rash. Moderately sharp pain noticed posterior to patella of right knee about 1 hr post dive which lasted about 5 mins and terminated into a dull ache which persisted for about 1/2 hr finally disappearing without recurrence. Dull pain in popliteal space of left knee noticed about 5.5 hrs post dive which lasted about 15 mins and disappeared without recurrence. Both knees felt still with mild soreness for remainder of day. Following a.m., left knee still felt a little stiff but no soreness. Moderate fatigue noticed about 5 hrs post dive lasting remainder of day to bed time.</p>					
41	Marginal	30	120	rest	<p>Severe skin itch over face, neck, shoulders, upper back, chest, arms and forearms and both thighs. Began 3 mins. post dive and lasted about 20 mins. No rash. No pains.</p>					
42	Marginal	120	270	rest	<p>Moderate fatigue noticed about 2 hrs post dive which lasted remainder of the day.</p>					
43	Marginal	120	210	work	<p>Mild skin itch over face, forearms and chest noticed immediately post dive and lasted 15 mins. No rash. No pains. Moderate fatigue and felt "dopey" noticed about 1300 (4.5 hrs post dive) which lasted to time of retiring at 2100.</p>					
44	Marginal	30	120	work	<p>Severe skin itch over face, neck, shoulders, arms forearms back and lower legs. Itch began on neck before reaching surface at about the 10' level (about 1/2 min prior to emergence from chamber) and lasted about 20 mins. No rash. No pains. Moderate fatigue noticed about noon (3.5 hrs post dive) which lasted to about 7-8 p.m. (11 hrs post dive)</p>					
45	Marginal	120	330	work	<p>Moderate skin itch over face, shoulders, chest, &amp; both forearms noticed about 3 min post dive, lasting 15 min; no rash, no pains. Moderate fatigue began after work period (2 hrs post dive) until ~ 1300 (4.5 post). Comparison: work - itch slightly less distribution &amp; duration and lesser intensity. Work - more fatigue than Rest dive.</p>					
46	Marginal	30	90	work	<p>Moderate skin itch over face, ears, neck forearms and thighs. Began 3-4 min post dive lasting about 30 mins. No rash. No pains. Moderate fatigue began about 1400 (5.5 hrs post dive) which lasted about 3 hrs.</p>					
	Marginal	30		work	<p>Severe burning skin itch over face, ears, neck, shoulders, arms, forearms, and upper back. None on chest, hands or below waist line. Began 2 min post dive lasted 25 min. No rash. No pains. Severe fatigue noticed about 1.5 hrs post dive. He was very tired all day to 1900 when he turned in early. Comparison: Itch: intensity the same for rest and work. Work - less distribution of itch. Work - less duration of itch. Pains: rest - mild pains left elbow. Work - no pains. Fatigue: Work - much more fatigue.</p>					

47	Marginal	120	420	rest	Mild bends. Mild skin itch over ears, face, neck, arms, forearms, thighs and slight on chest and upper back. Began 1 min post dive and lasted about 20 mins. No rash. Dull pain was noticed in his right knee about 7.5 hrs post dive lasting about 5 mins and disappearing without recurrence. About 4 hrs post dive also noticed a dull pain in his right elbow which lasted about 10 mins and disappeared without further recurrence. Very mild fatigue noticed about 1300 which lasted to about 1700 and disappeared. Comparison: Itch - more intense with work; greater disturbance (sic) with work; longer duration with work. Pains - sore back and thigh muscles, not bends, with work. Mild bends in 2 joints with rest. Fatigue - work produced more fatigue.
48	Marginal	120	540	work	(Borderline??) [later notation: "mild bends"] Moderate skin itch over entire body not involving hands, feet or ears. Noticed 1 min post dive and lasting about 30 mins. No rash. No joint pains, but muscles of lower back and anterior thighs felt sore about 6 p.m. (9 hrs post dive) lasting remainder of night. Retired at 11 p.m. but didn't sleep too well. Soreness persisted following day. Severe fatigue noticed with muscular soreness about 6 p.m. (9 hrs post dive) which lasted remainder of night and persisted following day. Fatigue and soreness may be due to the exercise done. Whether they were symptoms of mild bends is questionable.
49	DCS	-6	10	work	Bends. Severe skin itch involving entire body except his feet. Developed 1 min post dive lasting about 35 min. No rash. A dull pain first noticed about 10 min post dive involving both buttocks, hips, both thighs to just below the knees. The pain became worse with time and periodically was of a throbbing nature deep in the thigh muscles and coursed downward into the calves of both legs. Described a feeling of heaviness in both legs while he exercised. On walking to the chamber for treatment his legs felt heavy and he seemed to lose control of the sureness of his gait which required more effort than normal walking. No paralysis or paresthesias. Symptoms persisted for 1 hr 23 min post dive when he was recompressed at 1006 (Rx began 83 min post-dive). Partial relief attained at 20 ft, complete relief at 22 ft. Taken to 100 ft (1011) and brought out on Table 1 at 1232 symptoms free. No fatigue between dive and treatment. Moderate fatigue after emergence from treatment which lasted remainder of the day.
50	DCS	-6	9	work	Bends. Mild skin itch came on 3 min post dive over shoulders, arms and chest, lasted until treatment started. No rash. Difficulty in breathing started 9 min post dive. He had a tight feeling in his chest on deep breathing and had to bend forward to gasp for air. He had difficulty on inspiration. Dizziness then came on (head spun around). Vision was OK but things were moving. No cyanosis. Picture of shock took place (pale, cold sweat). No joint pains. No paralysis. Symptoms (dizziness and chest tightness) eased off at 40' and he got complete relief at 52 ft (20 min post dive). (Treated on Table 3; Rx began 16 min post-dive). No further symptoms during treatment except a tired feeling with stiffness of muscles in arms and chest. On emergence from the treatment chamber he felt like he had done a hard days work. And he had moderate fatigue, slight swelling of facial tissues (seemed to be present over cheek bones). He stated that it "felt like his neck was swollen a little too". There was no visible swelling in this area. His B.P. was 124/80 and chest clear to auscultation. Slight residual soreness remained 24 hrs after completion of treatment in chest, shoulders, and epigastrium.
51	Marginal	10	25	rest	Mild bends. Severe skin itch over entire body, head and extremities except feet and buttocks. Came on 3 min post dive, duration 45 min. Rash over right anterior-lateral chest and patches over posterior surface of both shoulders. Occasional sharp pain in posterior neck on movement, it began 25 min post dive and disappeared without treatment after 5 min. This was followed by (30 min post dive) mild right side headache which was continuous for 6.5 hrs at which time it disappeared spontaneously without therapy. Moderate fatigue came on 8.5 hrs post dive lasted until the diver retired at 2230. 24 hrs after dive the patient complained of moderate soreness over right shoulder. Comparison with 150' 30 min dive followed by work. With work dive, skin itch of less severity, smaller area, and shorter duration. Work and rest produced mild bends neither required treatment and apparently the pain and discomfort was of the same degree in both cases. Moderate fatigue with both dives.



52	Marginal	-6	15	work	<p>Mild Bends. Mild skin itch over chest, neck, ears, shoulders, and arms. Came on 3 min post dive and lasted 10 min. No rash. Sharp sudden transitory pain in left wrist occurred only during one weight lifting maneuver about 15 min post dive. Dull ache in right shoulder when "joint was relaxed". Came on 12 hr 19 min post dive and lasted about 1 hr. This pain would disappear when muscle tension was applied. Moderate fatigue came on about 6 p.m. (9 hrs post dive) and lasted until bedtime (2330). (took nap from 1800-2000). Following morning after dive had slight stiffness in back and thighs from exercise.</p> <p>Bends. Severe skin itch, generalized over entire body except lower back and from knees down. Began immediately post dive and lasted up to treatment recompression 18 min post dive. No rash. A sharp constant pain was noticed in the muscles of the nape of neck and upper border of left trapezius 14 min post dive. This continued severe for 4 mins when he was recompressed. No other symptoms. Placed in chamber at 0854 (18 min post-dive), got relief of neck pain at 25' and complete relief of trapezius pain at 30' (at 0856). Taken to 100' at 0857 and brought out at 1113 symptom free using Table I.</p> <p>No symptoms after Rx., except a mild pain was noticed along left costal margin in lower side of chest only on deep breathing at 1430. This lasted 1.5 hrs and disappeared without further recurrence. Mild fatigue present after Rx (about 1 hr later) and remained rest of day.</p> <p>Comparison: Itch - same intensity for both work and rest dives. Work: greater distribution of itch. Work: earlier appearance of itch. Rx given 18 min post dive while itch was still present . . . longer duration. Pains - work : bends. Rest: O.K. Fatigue - Rx interfered with evaluation of this symptom</p>
53	DCS	-6	14	work	<p>Bends. Moderate skin itch over face, neck, shoulders, chest, upper back and forearms. None below waist. Onset 3 min post dive lasting 20 min. No rash. A dull steady pain came on deep in the cubital area of right elbow, 2 hrs 5 mins post dive very soon after completion of work period. This persisted to time of recompression at 1118 (2 hrs 42 min post dive). During work period he noticed twinges of pain in his right elbow at 10 min post dive and also 30 min post dive but these lasted for only a portion of a minute and disappeared. Rx began at 1118, complete relief was obtained at 40' (at 1121). Taken to 100' at 1122 and brought out on Table I at 1343, symptom free. Moderate fatigue after treatment lasting remainder of day.</p> <p>Comparison: Itch - work : more intense itch, greater distribution, longer duration. Pains - work: bends. No pains with rest. Fatigue - Fatigue about same for both.</p>
54	DCS	0	125	work	
55	Marginal	10	60	rest	<p>Mild Bends. Mild skin itch over shoulders and upper lumbar area of back, also to lesser degree around ears. Came on 10 min post dive lasted about 10 min. No rash. Mild dull ache in right arm extending from wrist to shoulder. Patient described this pain as "flashing on and off every 15 min and lasting each time about 10 min". This intermittent pain came on about 1 hr post dive &amp; persisted until he retired at 2200 (~ 13 hrs post dive). No pain on arising in morning. Mild fatigue came on about 7 hrs post dive - remained until he retired at about 13 hrs post dive.</p>
56	DCS	-6	8	work	<p>Mild Bends (should have been treated). Mild skin itch over face, neck, shoulders, upper back, chest and thighs. Began 3 min post dive lasted 30 min. No rash. Pains developed in the proximal inter-phalangeal joints of his middle and ring finger of his right hand 8 min post dive lasted 7 min and then disappeared. About 1 hr later ( 1 hr 15 min post dive) these joints began to feel stiff but no soreness was present. The stiffness remained in these fingers for the rest of the day. Since no soreness was present, no treatment was given. He slept well that evening. The following morning all joints of his fingers of the right hand were stiff, with slight soreness also. Right wrist and lower forearm were stiff with some soreness. Swelling of the fingers, hand and lower right wrist was present. The swelling of fingers did not permit complete flexion of the fingers. Severe fatigue began about 2.5 hrs post dive which lasted about 2-3 hrs. Felt well during afternoon of dive day except for stiffness of fingers above mentioned. Comparison: work less intense itch, less distribution of itch. Duration about same for work and rest. Pains: work - mild bends Rest - no pains. Fatigue: work - severe fatigue rest - no fatigue</p>

57	Marginal	-6	17	rest	Mild Bends. Very mild skin itch over both forearms and a little on the arms. Began 5 min post dive lasted 10-15 min. No rash. Dull constant ache developed in left shoulder, began 15-20 min post dive lasted about 20-25 min. Left elbow developed dull ache about 20-25 min post dive and disappeared after about 10-15 min. No further recurrence. Mild post dive fatigue - 1300 (4 hrs 15 min post dive) lasted about 2 hrs.
58	DCS	10	30	work	Bends. Severe skin itch over entire body from waist up, except face (including hands and fingers). Came on 3-4 min post dive, duration 20-30 min) No rash. Dull ache (mild) over right shoulder area which came on 30 min post dive with duration of 10 min. Disappeared without treatment. 40 min post dive developed alternating sharp and dull pains in left shoulder, lasted 20 min at which time he began treatment of Table 1 (1 h post-dive). No fatigue before or after treatment. No recurrence of bends or residual complaints after 24 hrs. Comparison with 150' 30 min dive followed by rest. Bends requiring treatment with work and mild bends not requiring treatment with rest. Work - skin itch more severe, covered a larger area, and lasted longer. Mild fatigue after rest, none after work.
59	DCS	-6	15	rest	Bends. Severe skin itch over face, neck, shoulders, arms, forearms, chest, & upper back, none below waist. Began 2 min post dive lasting 15 min. No rash. A feeling of constriction or pressure deep in the suprasternal notch was noticed about 15 min post dive. States it felt like pressure against the windpipe but breathing was free and deep breathing caused no substernal soreness. This remained to onset of treatment. Generalized ache in upper back muscles began about 20-25 min post dive. Also slight nausea and a feeling of faintness came on (no dizziness). About 25 min post dive both shoulders, arms & proximal part of forearms felt a vibrating feeling or numbness (like the stinging felt when a baseball bat hits a stone wall) came on. No pain or muscle twitching. Just before entering chamber for treatment (29 min post dive) both shoulders arms and proximal part of forearms began to ache. Rx began at 0906 (29 min post dive). Ache in arms and forearms disappeared at 30', back muscles, particularly right trapezius still ached. Soreness in back disappeared at 42' at 0914. Taken to 100' (0916) and brought out at 1137 on Table I with no recurrence of symptoms. Mild fatigue after Rx to about 1500. No other post Rx symptoms. Slight stiffness noticed at insertion of right deltoid following a.m. gradually disappearing with use of arm.
60	DCS	30	120	work	Bends. Severe skin itch over entire body except abdomen, lower legs, hands and feet. Began 2 min post dive and lasted about 30 mins. Mild rash developed over arms, shoulders and chest about 45 min post dive which lasted about 1 hr and disappeared. A steady dull aching pain developed in sub deltoid area of right shoulder coursing from shoulder to deltoid insertion. Noticed about 2.5 hrs post dive and remained steady until time of treatment at 1256 (4 hrs 13 min post dive). Slight relief was obtained at 25' and complete relief at 48' (1301). Taken to 100' at 1303 and brought out on Table 1 at 1524 symptoms-free. No fatigue after dive or treatment. Comparison: Itch - intensity the same for work and rest. Work - greater distribution, longer duration. Rash: work - mild rash Rest - no rash. Pains: Bends developed after both work and rest. Work - pain in right shoulder 2.5 hr post dive. Rest - pain in neck and both shoulders arms forearms 25 min post dive. Pain following Rest was more alarming to diver. Fatigue: no remarkable difference between rest and work.
61	Marginal	10	30	rest	Mild Bends. Severe skin itch with burning under skin, all over entire body except feet and abdomen. Began 2 mins post dive lasting 30-35 mins. No rash. Dull pain or ache developed in his left elbow (just proximal to medial epicondyle) about 30 mins post dive which lasted about 30 min and disappeared spontaneously without further recurrence. No other pains. Mild fatigue noticed about 1300 4.5 hrs post dive) lasting remainder of day to bed time.
63	DCS	30	120	work	Mild skin itch over face, ears, and sides of neck. Began 3 min post dive and lasted 15 mins. No rash. No pains. No fatigue - just felt a little "dopey" or mentally sluggish about 2 hrs post dive to about 6 p.m. (9 hrs post dive). Note: itch of this dive was of less intensity than that after the 30 min (moderate itch) or 27 min (severe itch) dives followed by work. Fatigue of this dive was less than that after the 30 min (moderate fatigue) and 27 min (mild fatigue) dives followed by work.



64	Marginal	120	180	work	Mild skin itch over left cubital space beginning 3 min post dive lasting 12 min. No rash. No pains. Moderate fatigue beginning 3 hrs post dive and remaining rest of day to time of retiring at 2100 (12 hrs post dive). Note: had somewhat less itch as that following the 30 min dive followed by work. Fatigue more pronounced this dive than the 30 min dive followed by work.
66	DCS	30	120	rest	Severe skin itch involving all of body from waist up, none from waist down, beginning 2 min post dive and lasting 25 min. No rash. No pains. No fatigue - felt mentally sluggish and "dopey" about 2 hrs post dive.
67	DCS	40	120	rest	(Questionable swelling right eyelid on day following dive) Severe skin itch over face, neck, shoulders, upper back, arms forearms and lower legs. Began 1 min post dive and lasted 30 min. No rash. No pains. Moderate fatigue noticed about 2 hrs post dive and lasted to about 1500 (about 6 hrs post dive). Felt mentally groggy and "dopey" after dive for remainder of day. About 2100 (12 hrs post dive) slight swelling of tissues of right upper eyelid was noticed. No pain or headache was present. No visual disturbance. Slept well that evening. Slight swelling of right eyelid remained throughout following day. Mild conjunctival infection present. 2nd day after dive, eyelid was normal. Questionable etiology - conjunctivitis? Comparison on 150' 36 min dive followed by work. Itch about same intensity for both dive. Work - greater distribution of itch. Work - less duration of itch. Work - rash. Rest - no rash. Work - bends. Rest - no pains Work - extreme fatigue. Rest - moderate fatigue
68	DCS	120	300	rest	Severe skin itch over entire body except hands and feet. Began 3 min post dive, lasted ~ 1 hr. No rash, no pains, no fatigue. Felt mentally sluggish & dopey about 1400 (5 hrs post dive) which remained for about 3 hrs. Comparison with 150', 36 min dive followed by work: Work - less intense itch. Itch of lesser duration. Itch of lesser distribution. No pains, rash or fatigue with either dive. Work - slight soreness and stiffness of right knee on following day.
69	DCS	-6	10	work	Mild Bends. Moderate skin itch developed about 1.5 min post dive over entire body form the waist up. Lasted 25 min and disappeared. No rash. A sharp pain was noticed in the upper border of the right trapezius extending down to the right shoulder joint. This lasted about 10 min and disappeared. Stiffness of right shoulder lasted the remainder of the day (no further pains). Mild fatigue was noticed 2 hrs post dive and lasted about 2 hrs. Subject felt mentally sluggish and "dopey" after dive for the rest of the day. Comparison: Work < intense itch; distribution =; duration of itch =. Work - mild bends Rest - no pains. Work - mild fatigue Rest - none.
70	DCS	10	60	work	Bends. Severe skin itch generalized over entire body except hand and feet. Began 2 min post dive and lasted about 20 mins. Faint rash of measles type appeared over arms and sides of chest about 45 min post dive which faded away about 1 hr later. About 1 hr post dive a pins and needles feeling developed over lateral side of right foot just below and behind the external malleolus and over lateral half of his sole. This lasted 30 min and disappeared. No muscular weakness or areas of anesthesia were present. Extreme fatigue was experienced about 2 hr post dive and lasted remainder of day. Also felt mentally groggy and dopey. Headache over temples and forehead developed at 1230 (3.5 hrs post dive) for which he took two aspirins at 1330 and was relieved at 1400. He turned in to retire at 2000 and was awakened at 2245 (13.5 hrs post dive) with pains in both feet. Right foot was worse and pain was located below the external malleolus extending over instep to the base of his toes dorsally. In the left foot there was less pain below external malleolus and over instep but the bottom of his big toe was particularly painful especially after donning his shoes and with weight bearing. Pains in feet were dull and constant. No muscular weakness was present. Treatment was given at 2352 (14 hrs 38 min post dive) Relief of pain in right foot complete at 50 ft and in left foot at 65 ft (1158). Taken to 165 ft at 0002. At 165 ft the pains seemed to recur in both feet almost to its original intensity. Left toe was still quite painful at 165 feet. Began to ease off on ascent about the 100 ft level (Table II) and when put on oxygen only residual soreness remained. Residual soreness in left toe persisted for remainder of treatment and after treatment (0403). Residual soreness in left toe remained on morning and early afternoon following treatment. This disappeared during late afternoon after which time he felt normal.

71	Marginal	-6	10	work	<p>Mild Bends. Severe skin itch over entire upper part of body except from waist line down and hands. Began 1 min before reaching surface (at 20' coming out) and lasted to 30 min post dive. No rash. A dull pain was noticed in both pectoral muscles about 4 min post dive which lasted 15 min and finally disappeared. It was not aggravated by or relieved any by deep breathing (not chokes). About 1.5 hrs post dive his right arm felt tired just above and below elbow joint. (No pain, paresthesia or weakness - a sensation of fatigue as after pitching a baseball). This remained to about 1900 and disappeared (10 hrs post dive). No fatigue.</p> <p>Comparison with 150' 36 min dive followed by rest: Work - more intense itch; itch of greater distribution; itch of longer duration. Work - mild bends Rest - no pains. No fatigue with either dive. Some nausea after rest dive - none after work dive.</p>
72	DCS	-6	10	rest	<p>Bends. No itch or rash up to time of treatment. About 10 min post dive a dull steady pain was noticed over medial aspect of right elbow. This lasted about 8 min when it disappeared and shifted down to his right wrist becoming sharp in character. At same time his whole right hand began to feel numb "like the circulation was cut off". The wrist pain and numbness of hand remained about 15 min when he was recompressed at 0925 (33 min post dive). Complete relief obtained at 20' at 0906 the wrist pain disappearing before the numb feeling in the hand. Taken to 100 ft at 0928 and brought out symptomless at 1149 using Table I. No symptoms remainder of day. No fatigue. Following morning noticed some stiffness in joints of right hand but no pains. Note: no itch following this dive. Had mild itch following 150 ft for 30 min dive with Rest, and also 150 ft for 27 min dive with Rest. No pains or fatigue with these dives.</p>
73	Marginal	30	90	work	<p>Mild Bends. Mild skin itch over ears, neck, upper back, both arms, and forearms around cubital space. Began 5 min post dive and lasted 15 min. No rash. A dull inconstant pain developed in right elbow (cubital space) occasionally throbbing in character about 1.5 hrs post dive. These pains were present inconstantly (<i>sic</i>) all day to about 5 p.m. (8 hrs post dive) when they finally disappeared. They were more frequent and slightly worse in morning, only mild in afternoon. Moderate fatigue - began about 1200 (3 hrs post dive) which lasted to about 6-7 p.m. (9-10 hr post dive).</p> <p>Comparison with 150' 36 min dive followed by rest. Rest - no itch Work - mild itch</p> <p>Rest - bends Work - mild bends. Rest dive &amp; Rx - no fatigue Work - moderate fatigue</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	edu849lt2	0.0	21	100.0	40.0	4.0			edu849.dat 1 REPETS=1
2	edu849lt2	0.5	1	100.0	40.0	4.0	74.0	164.0	edu849.dat 1 REPETS=1
3	edu849lt2	0.5	1	100.0	40.0	4.0	74.0	194.0	edu849.dat 1 REPETS=1
4	edu849lt2	0.5	1	100.0	40.0	4.0	74.0	164.0	edu849.dat 1 REPETS=1
5	edu849lt2	0.5	1	100.0	40.0	4.0	164.0	224.0	edu849.dat 1 REPETS=1
6	edu849lt2	1.0	1	100.0	40.0	4.0	74.0	194.0	edu849.dat 1 REPETS=1
7	edu849lt2	0.0	5	100.0	45.0	4.0			edu849.dat 27 REPETS=1
8	edu849lt2	0.5	1	100.0	45.0	4.0	79.0	169.0	edu849.dat 27 REPETS=1
9	edu849lt2	0.5	1	100.0	45.0	4.0	169.0	289.0	edu849.dat 27 REPETS=1
10	edu849lt2	0.5	1	100.0	45.0	4.0	59.0	77.0	edu849.dat 27 REPETS=1
11	edu849lt2	0.0	8	100.0	50.0	4.0			edu849.dat 35 REPETS=1
12	edu849lt2	0.5	1	100.0	50.0	4.0	54.0	74.0	edu849.dat 35 REPETS=1
13	edu849lt2	0.5	1	100.0	50.0	4.0	64.0	84.0	edu849.dat 35 REPETS=1
14	edu849lt2	0.5	1	100.0	50.0	4.0	84.0	204.0	edu849.dat 35 REPETS=1
15	edu849lt2	1.0	1	100.0	50.0	4.0	64.0	99.0	edu849.dat 35 REPETS=1
16	edu849lt2	0.0	10	100.0	55.0	4.0			edu849.dat 47 REPETS=1
17	edu849lt2	0.5	1	100.0	55.0	4.0	179.0	269.0	edu849.dat 47 REPETS=1
18	edu849lt2	0.5	1	100.0	55.0	4.0	179.0	239.0	edu849.dat 47 REPETS=1
19	edu849lt2	0.5	1	100.0	55.0	4.0	89.0	179.0	edu849.dat 47 REPETS=1
20	edu849lt2	1.0	1	100.0	55.0	4.0	179.0	599.0	edu849.dat 47 REPETS=1
21	edu849lt2	1.0	1	100.0	55.0	4.0	69.0	89.0	edu849.dat 47 REPETS=1
22	edu849lt2	1.0	1	100.0	55.0	4.0	89.0	239.0	edu849.dat 47 REPETS=1
23	edu849lt2	1.0	1	100.0	55.0	4.0	69.0	119.0	edu849.dat 47 REPETS=1
24	edu849lt2	1.0	1	100.0	55.0	4.0	179.0	1319.0	edu849.dat 47 REPETS=1
25	edu849lt2	0.0	14	100.0	60.0	4.0			edu849.dat 65 REPETS=1
26	edu849lt2	0.5	1	100.0	60.0	4.0	74.0	124.0	edu849.dat 65 REPETS=1
27	edu849lt2	1.0	1	100.0	60.0	4.0	94.0	169.0	edu849.dat 65 REPETS=1

28	edu849lt2	1.0	1	100.0	60.0	4.0	94.0	214.0	edu849.dat	65	REPETS=1
29	edu849lt2	0.5	1	100.0	60.0	4.0	184.0	424.0	edu849.dat	65	REPETS=1
30	edu849lt2	0.5	1	100.0	60.0	4.0	94.0	184.0	edu849.dat	65	REPETS=1
31	edu849lt2	0.5	1	100.0	60.0	4.0	94.0	184.0	edu849.dat	65	REPETS=1
32	edu849lt2	0.0	3	150.0	27.0	6.0			edu849.dat	85	REPETS=1
33	edu849lt2	0.5	1	150.0	27.0	6.0	153.0	213.0	edu849.dat	85	REPETS=1
34	edu849lt2	0.5	1	150.0	27.0	6.0	153.0	333.0	edu849.dat	85	REPETS=1
35	edu849lt2	0.5	1	150.0	27.0	6.0	63.0	153.0	edu849.dat	85	REPETS=1
36	edu849lt2	1.0	1	150.0	27.0	6.0	63.0	153.0	edu849.dat	85	REPETS=1
37	edu849lt2	1.0	1	150.0	27.0	6.0	27.0	38.0	edu849.dat	85	REPETS=1
38	edu849lt2	0.5	1	150.0	27.0	6.0	63.0	213.0	edu849.dat	85	REPETS=1
39	edu849lt2	0.5	1	150.0	27.0	6.0	43.0	93.0	edu849.dat	85	REPETS=1
40	edu849lt2	0.0	11	150.0	30.0	6.0			edu849.dat	95	REPETS=1
41	edu849lt2	0.5	1	150.0	30.0	6.0	66.0	156.0	edu849.dat	95	REPETS=1
42	edu849lt2	0.5	1	150.0	30.0	6.0	156.0	306.0	edu849.dat	95	REPETS=1
43	edu849lt2	0.5	1	150.0	30.0	6.0	156.0	246.0	edu849.dat	95	REPETS=1
44	edu849lt2	0.5	1	150.0	30.0	6.0	66.0	156.0	edu849.dat	95	REPETS=1
45	edu849lt2	0.5	1	150.0	30.0	6.0	156.0	366.0	edu849.dat	95	REPETS=1
46	edu849lt2	0.5	1	150.0	30.0	6.0	66.0	126.0	edu849.dat	95	REPETS=1
47	edu849lt2	0.5	1	150.0	30.0	6.0	156.0	276.0	edu849.dat	95	REPETS=1
48	edu849lt2	0.5	1	150.0	30.0	6.0	156.0	576.0	edu849.dat	95	REPETS=1
49	edu849lt2	1.0	1	150.0	30.0	6.0	30.0	46.0	edu849.dat	95	REPETS=1
50	edu849lt2	1.0	1	150.0	30.0	6.0	30.0	45.0	edu849.dat	95	REPETS=1
51	edu849lt2	0.5	1	150.0	30.0	6.0	46.0	61.0	edu849.dat	95	REPETS=1
52	edu849lt2	0.5	1	150.0	30.0	6.0	30.0	51.0	edu849.dat	95	REPETS=1
53	edu849lt2	1.0	1	150.0	30.0	6.0	30.0	50.0	edu849.dat	95	REPETS=1
54	edu849lt2	1.0	1	150.0	30.0	6.0	36.0	161.0	edu849.dat	95	REPETS=1
55	edu849lt2	0.5	1	150.0	30.0	6.0	46.0	96.0	edu849.dat	95	REPETS=1
56	edu849lt2	1.0	1	150.0	30.0	6.0	30.0	44.0	edu849.dat	95	REPETS=1
57	edu849lt2	0.5	1	150.0	30.0	6.0	30.0	53.0	edu849.dat	95	REPETS=1
58	edu849lt2	1.0	1	150.0	30.0	6.0	46.0	66.0	edu849.dat	95	REPETS=1
59	edu849lt2	1.0	1	150.0	30.0	6.0	30.0	51.0	edu849.dat	95	REPETS=1

60	edu849lt2	1.0	1	150.0	30.0	6.0	66.0	186.0	edu849.dat 95 REPETS= 1
61	edu849lt2	0.5	1	150.0	30.0	6.0	46.0	66.0	edu849.dat 95 REPETS= 1
62	edu849lt2	0.0	3	150.0	33.0	6.0			edu849.dat 127 REPETS= 1
63	edu849lt2	1.0	1	150.0	33.0	6.0	69.0	159.0	edu849.dat 127 REPETS= 1
64	edu849lt2	0.5	1	150.0	33.0	6.0	159.0	219.0	edu849.dat 127 REPETS= 1
65	edu849lt2	0.0	1	150.0	36.0	6.0			edu849.dat 132 REPETS= 1
66	edu849lt2	1.0	1	150.0	36.0	6.0	72.0	162.0	edu849.dat 132 REPETS= 1
67	edu849lt2	1.0	1	150.0	36.0	6.0	72.0	162.0	edu849.dat 132 REPETS= 1
68	edu849lt2	1.0	1	150.0	36.0	6.0	162.0	342.0	edu849.dat 132 REPETS= 1
69	edu849lt2	1.0	1	150.0	36.0	6.0	36.0	52.0	edu849.dat 132 REPETS= 1
70	edu849lt2	1.0	1	150.0	36.0	6.0	52.0	102.0	edu849.dat 132 REPETS= 1
71	edu849lt2	0.5	1	150.0	36.0	6.0	36.0	46.0	edu849.dat 132 REPETS= 1
72	edu849lt2	1.0	1	150.0	36.0	6.0	36.0	52.0	edu849.dat 132 REPETS= 1
73	edu849lt2	0.5	1	150.0	36.0	6.0	72.0	132.0	edu849.dat 132 REPETS= 1
74	edu849lt2	0.0	1	150.0	36.0	6.0			edu849.dat 132 REPETS= 1

## **SECTION I. SINGLE AIR DIVES**

### **H. NMR97NOD**

- 103 dives: 3 DCS 4 Marginal
- All dives were wet; water temperature maintained at  $70\pm 1^{\circ}\text{F}$
- Dives were conducted during the period April - July 1997
- Exercise during exposure alternated 10 minutes on a cycle ergometer at 50 watts with 10 minutes of rest.
- Descriptions of all medical manifestations were taken directly from the medical folders: pre-dive, post-dive and summary write-ups by attending DMO(s).

1. R Ball and E Parker. A trial to determine the risk of decompression sickness after a 40 feet of sea water for 200 minute no-stop air dive. Aviation Space and Environmental Medicine, in press.

## SECTION I: SINGLE AIR DIVES

### H. NMR97NOD 103 dives: 3 DCS, 4 Marginals

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
2	Marginal	120	408	Dive reached surface at 1212; approximately 1900 diver experienced pain behind left knee lasting 10 minutes. Resolved spontaneously without recurrence.
3	Marginal	10	30	Diver was asymptomatic upon reaching surface and at the 10 min exam. At the 24 hour exam diver reported pain in the right hand 4th 5th metatarsal as mildly achy - resolved about 15 minutes. Also reported left anterior ankle with a dull pain, resolved after 10 minutes. He reported that both of these pains occurred about 30 minutes after reaching surface and during his shower. Diver was without pain or complaints at the two hr exam.
4	Marginal	30	222	Reached surface at 1148; about 1530 diver experienced intermittent pain in left foot and ankle; pain lasted 10 min, would go away for 10-15 min; 3/10 in severity when present; this intermittent pain lasted approx 3 hours. Resolved, no recurrence.
5	DCS	120	321	Diver surfaced at 1154; at 10 minute check complained of a headache and said that he had already taken 800 mg motrin; described headache as very routine for him "I get these headaches all the time after I dive ... they're not that bad". Headache had no associated auditory, visual, vertiginous or neurologic symptoms. Diver appeared comfortable and had a normal neuro exam. At 1715 he noticed right elbow pain, deep non-radiating 3/10 intensity. Described as "full feeling, as if (tensely) swollen". Pain persisted without change/improvement for ~ 3 hours. Diver was treated at 2122 (USN TT6 no extensions) and had complete relief at 19 minutes; he surfaced from treatment asymptomatic and had a normal neuro exam; remained asymptomatic at one-hour post treatment check.
6	DCS	0	66	Diver surfaced at 1139 without symptoms except slight chilling. During the 10 minute post dive exam he reported mildly "muffled hearing" from his left ear; physical exam was unremarkable and neuro exam was likewise normal. The hearing deficit was discussed with him and ascribed to an acuity threshold decrease due to placement of his underwater transmitter close to the afflicted ear. No action was taken. At approx 1245 the diver reported continued symptoms of muffled hearing and a sensation of ear fullness; he also mentioned to a colleague that he was not feeling quite 100%; a thorough neuro exam was performed with some findings: <ul style="list-style-type: none"> <li>• Anisocoria, 2 mm differential in mydriasis (R&gt;L), with marked hippus, equally reactive pupils, intact extraocular movement.</li> <li>• Leftward gaze nystagmus, 3-4 beats</li> <li>• Decreased auditory acuity left ear, by whisper and tuning fork; Weber: right lateralization; Rinne-positive (ac&gt;bc)</li> <li>• Mental status errors in concentration (months backwards, coin change summation); corrected with prompting</li> <li>• Disoriented to date</li> <li>• Heel-to-toe walking with misstep to left</li> </ul> He was reevaluated by a second DMO who confirmed the findings, without reproducible nystagmus. The diver expressed "feeling strange" and manifested confusion and labile emotions during the evaluation of his orientation to

6 (cont)				<p>time. He was unable to correctly discern the passage of time since completion of the dive, expressing incredulity that nearly 2 hours had passed since surfacing. At 1315 the diver was recompressed to 60 fsw on 100% O<sub>2</sub>. Soon after reaching 60 fsw he had rapid relief of his subjective symptoms, stating that he "...felt like he was back to normal, with a clear head." Within 15 minutes of being at 160 fsw he reported normal auditory acuity in both ears. A full neuro exam was normal. His mild anisocoria remained unchanged. USN TT6 (no extensions) was completed; post treatment 10 minute and 1 hour exams were normal. His subsequent 2 days were unremarkable with no complaint of residual symptoms. On the 3rd day (after the dive) he was reevaluated and complained of progressive concentration difficulties (difficulty recalling objects &amp; with serial backward counting). He reported no other symptoms; was retreated with hyperbaric O<sub>2</sub> on a USN TT6. Treatment and post-treatment neuro exams revealed improvement in concentration. Treated was completed with some possible residual concentration ability. The following day (day 4 after dive) the diver was subjectively improved in his ability to concentrate, but still felt "distracted"; mild residual objective findings with missed memory recall and poor serial 7 screen. He was retreated with a TT6 on O<sub>2</sub>. Post-treatment he exhibited continued mild decrease in concentration ability but overall improvement; remainder of neuro exam was normal. Diver reported subjective improvement in ability to concentrate and no other neurological symptomatic recurrence; no additional treatments were performed. Neuropsychometric testing about 1 week later revealed significant deficits in verbal and spatial location memory and visual motor scanning speed. A neurological evaluation including EEG and MRI was unremarkable. Other evaluations, including ophthalmologic, audiometric and otolaryngologic, were normal. He continued to have gradual improvement of his subjective complaints, and follow-up neuropsychometric testing 1 year later was improved, but continued to show significant deficits.</p>
8	Marginal	10	49	<p>Diver surfaced 1139 without symptoms - remained asymptomatic at the 10 min exam. About an hour after surfacing he reported to medical that at approx 1228 (diver's estimate) while in the shower, he noted a wine-purple discoloration over his left patella. When he reported to medical it was fading but still detectable; he denied itching, pain or other symptoms. Area affected was ~ 10 x 6 cm. DMO impression: cutis marmorata. Resolved without treatment or recurrence.</p>
9	DCS	10	72	<p>Diver surfaced 1139 without symptoms but did report that he had had some mild pain (2/10) in both knees from riding the bicycle while on the bottom only - nothing upon surfacing. Water in the wet pot was described as particularly foul by fellow divers and the post-dive recalibration of water depth indicated that the dive profile was actually 41+200 -- not knowing this earlier, the diver was decompressed according to the standard 40/200 table. Diver remained asymptomatic through the 10 min exam. At approx 1245, while looking in a mirror after showering he noticed a purplish marbling of the skin on his abdomen that became pruritic but painless. He also noticed (approx 1250) a slowly expanding scintillating fortification scotoma in his far left visual field; reported these symptoms to medical at 1300. No other symptoms, no pain, no headache, and no new neuro symptoms. Said his visual complaints were different from those had experienced with AGE in 1996, but were similar to ones noted following previous dives on approx 12 occasions, although none recently. Prior post-dive evaluations of this complaint led to a diagnosis of (acephalgic?) migraine and no treatment tables had been used for this in the past. He was observed to have dusky purple mottled non-raised rash on the abdomen (both sides), over right lateral scapular region, and over left posterior triceps regions. Over several minutes these rashes changed from primarily cyanotic to primarily erythematous and became increasingly pruritic. Over the same period of observation his scintillating scotoma began to resolve spontaneously. Neuro exam (including mental status) was normal except for left foot dorsiflexion (4/5) and EHL (4 1/5 weakness and decreased sensation over left big toe that was unchanged from pre-dive exam. Presumptive diagnoses of cutis marmorata and migraine were made and</p>



9 (cont)			he was recompressed to 60 fsw (treatment began 1334). Just before entering the chamber he noted scintillating scotoma had re-expanded. During compression the tender noted two more patches (on both flanks) appear and diver complained of pruritis in those regions. Upon reaching 60 fsw the scintillating scotoma resolved rapidly & completely and he did not develop a headache. At 10 min his pruritis and rash were improving, but not completely resolved so a decision was made to treat with TT6. At 1408 his pruritis and rashes had completely resolved. The remainder of his treatment was uneventful except for some chest tightness and 2 occasions of dry cough near the end of the treatment. The 10 min and 1 hr post-treatment exams were normal; 12 hrs post-treatment he remained asymptomatic; skin was normal.
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Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	nmr97nod	0.0	86	40.0	200.0	2.0			simplified safe dives
2	nmr97nod	0.5	1	40.0	200.0	2.0	322.5	610.5	simplified marg
3	nmr97nod	0.5	1	40.0	200.0	2.0	212.5	232.5	simplified marg
4	nmr97nod	0.5	1	40.0	200.0	2.0	232.5	424.5	simplified marg
5	nmr97nod	1.0	1	40.0	200.0	2.0	322.5	523.5	simplified dcs
6	nmr97nod	1.0	1	40.0	200.0	2.0	202.5	268.5	simplified dcs
7	nmr97nod	0.0	10	41.2	200.0	2.0			simplified safe dives
8	nmr97nod	0.5	1	41.2	200.0	2.0	212.5	251.5	simplified marg
9	nmr97nod	1.0	1	41.2	200.0	2.0	212.5	274.5	simplified dcs

## **SECTION I: SINGLE AIR DIVES**

### **I. EDU545**

- 94 dives; 18 DCS, 7 Marginal
- Some dives were wet, some were dry. Temperature of the wet dives ranged from 38°F to 64°F (mean = 51°F)
- Dives were conducted during the period October 1944 - March 1945
- Exercise: dives were both "work" and "rest". During the "rest" dives, the divers moved as little as possible while on bottom. The "work" dives entailed lifting a 70 lb weight (58 lbs submerge) from a 26" bench 10 times per minute while on bottom (ref 1).
- Diagnoses of DCS were initially made by Dr. Van der Aue as reported in reference 1. With the additional information from the dive logs, re-diagnoses were made in 07 April 1997 using the criteria established by Weathersby in 1988 (Appendix A). The re-diagnoses were made by collective decision of the following:
  - CDR Charles Auken MC USN
  - LCDR Robert Ball MC USNR
  - LCDR Charles Toner MC USN
  - LCDR Daniel Valaik MC USN
  - LT Thomas Buttolph MC USN
  - Edward T. Flynn MD (MC USN RET)
- Manifestation descriptions were available in abbreviated form in reference 1. The detailed descriptions shown here were taken directly from the dive logs.

1. Van Der Aue, OE, ES Brinton, RJ Kellar. Surface Decompression, Derivation and Testing of Decompression Tables with Safety Limits for Certain Depth and Exposures. Naval Experimental Diving Unit, Technical Report 5-45, January 1945.

## SECTION I: SINGLE AIR DIVES

### I. EDU545 94 dives; 18 DCS, 7 Marginal

Profile #	Outcome	conditions	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
1	DCS	?	-1	20	Had slight mottled rash over right lateral chest in same area where he had previous skin bends (see 10-30-44). No itching. Thought he noticed slight "twinges" of pain in both shoulders and hips. Noticed about 20 mins after coming up - disappeared spontaneously about :1400. No fatigue! This case is underline ( <i>sic</i> ) and questionable as regards bends. No Rx given and run was otherwise uneventful.
2	Marginal	dry/work	-1	1440	No complaints. Moderate fatigue after dive.
3	DCS	wet/work	30	90	About 1.5 hrs after completion of this tank dive, patient developed marked skin bends over thoracic area. Also noticed a gradual constant aching pain in left shoulder. This became worse and patient was recompressed @1417. Pain in shoulder was relieved at 50'. He was taken to 100 ft and given Rx on air table as follows. Left Surface 1417 reach 100' @ 1420 At 100 ft 30 min 40 ft 35 min 90 ft 12 min 30 ft 42 min 80 ft 12 min 20 ft 52 min 70 ft 12 min 10 ft 68 min 60 ft 26 min Reached surface 1949 50 ft 30 min At time of surfacing patient felt well. 2 hours after Rx patient had recurrence of pain involving left knee which was mild and intermittent in character. During next air ( <i>sic</i> ) pain increased. Also noticed skin bends and rash over anterior aspect of both thighs. He returned to EDU and was recompressed. All symptoms were relieved @ 50' and decompressed as follows: Left surface 0007 (11/25) 50 ft 30 min 20 ft 2 hours 40 ft 35 min 10 ft 2 hours 30 ft 12 hours Reached surface 1726 (11/25) On surfacing patient had no complaints
4	DCS	wet/work	30	68	While making his wet dive, this patient stated that he felt rather dizzy in about 10 min after reaching bottom. He said that he felt as though he was at about 300 feet. He was told to supply more air which remedied the situation and felt that his slight symptoms were probably due to CO <sub>2</sub> effects. Completed the required 85 min on bottom with work without further trouble. Came out from regular decompression dive at 1122. About 1230 patient's skin began to itch and a marked rash with mottling around entire waist. About 1245 he noticed some spots before the eyes and slight blurring of vision. He was taken to 165 feet leaving surface at 1253. This patient had no joint pains or other aches. On going down he said the spots and blurring of vision left him @ 100 ft in the right eye and about 140 ft in the left eye. Was comfortable @ 165 and rash disappeared in 27 min. Taken out on following Rx table:

4 (cont)					<p>165 ft 30 min 60 ft 30 min on O<sub>2</sub></p> <p>140 ft 12 min 50 ft 30 min on O<sub>2</sub></p> <p>120 ft 12 min 40 ft 30 min on O<sub>2</sub></p> <p>100 ft 12 min 40 ft to surface 10 min on O<sub>2</sub></p> <p>80 ft 12 min</p> <p>Reached surface @ 1603. Patient had no further symptoms except that he thought he felt slight pains in his left elbow which lasted 10 min and disappeared without recurrence. No further symptoms.</p> <p>Following AM patient felt well, had a good nites sleep.</p> <p>About 1/2 hour after coming out, noticed slight itching on volar aspect of left wrist and redness of skin. Also noticed slight fleeting pains in left wrist joint and forearm muscles. Case symptoms were mild and recompression was not deemed necessary. The rash disappeared about 1730 and mild fleeting pains lasted throughout the day, not getting any worse. Slept well. Feels normal the following AM except slight soreness of all bases of fingers in palm. This is probably a case of mild bends not requiring recompression.</p>
5	DCS	wet/work	10	30	<p>About 1400 patient noticed slight pain in longitudinal arch of right foot anterior to heel and about area of talocalcaneal joint. This was mild and transient, persisting throughout the day and not severe enough to warrant recompression. Said it felt like a "sprained ankle". Slept well. Not unduly fatigued.</p> <p>Following AM noticed slight pains on lateral aspect of right ankle joint. The pains on the inner side of arch had disappeared. The ankle joint pain is noticeable only on weight bearing. Not severe enough to warrant recompression.</p> <p>This case is interesting because patient sprained his right ankle in June requiring strapping. Of the hits in this patient on previous runs, he has been hit in this joint before. See 11-14-44.</p>
6	DCS	wet/work	30	128	<p>Subject had slight skin itch over both arms on surfacing lasting about 1 hour. About 1 hour after dive he noticed slight soreness over back of right elbow in region of tendinous insertion of triceps muscle at its insertion into the olecranon. This pain or soreness was mild not getting any worse until 1930 at which time the pain became more severe and of throbbing character. Recompressed @ 1941 (8 hours and 29 min after dive and about 7.5 hours after onset of first soreness). Did not obtain relief (partial relief @ 40 ft going) even after 1/2 hour at 165 ft. Said he first noticed relief on reaching 140 ft stop coming. From there on he noticed only very mild residual soreness in back of elbow. Decompressed as follows:</p> <p>165 (reached 1947) 30 min</p> <p>140 (noticed definite relief) 12 min</p> <p>120 ft 12 min 60 ft 30 min on O<sub>2</sub></p> <p>100 ft 12 min 50 ft 30 min on O<sub>2</sub></p> <p>80 ft 12 min 40 ft 30 min on O<sub>2</sub></p> <p>Surface 5 min on O<sub>2</sub> Surfaced @ 2348</p> <p>At 100 ft level coming down he had no symptoms. Coming from this depth he noticed slight residual pain in elbow alternately on and off. Came to surface with only slight residual soreness. Slept well that evening. Following AM felt well - slight had very slight residual soreness back of elbow. This subject experienced no fatigue after his dive or Rx done.</p>
7	DCS	wet/work	10	60	<p>No complaints. Had moderate skin itch over back and both arms lasting about 2 hours. Had slight macular rash over biceps and triceps area which disappeared in 2 hours. No other complaints.</p>
8	Marginal	wet/work	-1	10	

9	Marginal	wet/work	-1	1440	No complaints. Moderate fatigue after dive. No other complaints.
10	DCS	wet/work	10	60	<p>Patient had generalized skin itch over both legs lasting 1.5 hours after dive. About 1 hr after dive he noticed a dull aching pain in his left wrist located deep in the joint noticed both dorsally and ventrally. About 15 min later he noticed a worse pain in his left elbow in area of biceps tendon insertion. Both joints were painful, the elbow more severe and patient was placed under recompression at 1217 (1 hr 25 min after dive) and obtain complete relief @ 18 ft. Reached 100 ft at 1220 and decompressed as follows:  100 ft 30 min 60 ft 30 min on O<sub>2</sub> 80 ft 12 min 50 ft 0 min on O<sub>2</sub>  40 ft 30 min on O<sub>2</sub> surfaced 5 min on O<sub>2</sub> surfaced @ 1441  No further complaints.</p>
11	DCS	wet/work	10	45	<p>About 45 min after surfacing, he noticed general soreness of both shoulders. This man has a mild bursitis of his left shoulder which troubles him on some work dives such as this one. This time he had soreness in right shoulder also which was indefinitely (<i>sic</i>) localized. Also felt fatigued after his dive. Said his arms did not bare (<i>sic</i>) full strength. Put under recompression @ 1250 (1 hr 49 min after dive) and obtained partial relief of right shoulder @ 17 ft with complete relief @ 30 ft. The left shoulder (bursitis) had dull ache throughout treatment period but felt better under pressure. Decompressed as follows:  180 ft 30 min  80 ft 12 min  60 ft 30 min on O<sub>2</sub>  50 ft 30 min on O<sub>2</sub>  40 ft 30 min on O<sub>2</sub>  surfaced 5 min on O<sub>2</sub>  Emergenced feeling fine - no further complaints.</p>
12	DCS	wet/work	30	176	<p>Had no trouble following dive. About 2 PM he noticed a mild soreness of deltoid muscle at its insertion. Also some soreness in back of arm over triceps. He felt generally tired. About 10 PM he had soreness of both forearms about its mid portion (musculotendinous junction) and in his hands. Noticed slight swelling of left hand and moderate swelling of right hand. The pain in his forearms kept him awake. The following AM he reported his condition of the Medical Officer. At this time he had moderate residual swelling of his right hand with some oedema. Presented a picture of s??? or lymphatic stasis ???  Couldn't make a tight fist due to the swelling. It was believed that his condition was postponed too long to benefit from recompression - massage and elevation prescribed. This subject had no joint pains. Soreness was in muscles and tendinous areas. Noticed finger muscles and tendons sore but periarticular areas were free of soreness. Patient was quite fatigued. No itch. No skin rash.</p>
13	DCS	wet/work	10	48	<p>This subject surfaced from his completed run @ 1112. About 1200 noticed slight pain in right shoulder. This did not disappear. Gradually became worse and at 1310 he was recompressed obtaining relief at 25 ft. He was taken to 165' following a routine prescribed Rx and decompressed as follows:  Left surface 1310 arrived 165' @ 1312 remained 30 min  140' 12 min 60' 30 min on O<sub>2</sub>  120' 12 min 50' 30 min on O<sub>2</sub></p>

13 (cont)				<p>100' 12 min 40' 30 min on O<sub>2</sub> 80' 12 min surface 5 min on O<sub>2</sub> reached surface @ 1612 at 1645 patient noticed some stiffness in right hip which also developed pain shortly afterward. In 15 min this pain became increasingly severe. Recompression was given. Just before recompression, patient got hit with severe pain in left hip also. Left surface @ 1721 and obtained relief at 30'. Given 12 hour soak and brought out as follows: Left surface 1721 arrived 30' @ 1723 remained 12 hours 0521 (12/2/44) 20' 2 hours 10' 2 hours. Surfaced @ 0924. Patient had no complaints on surfacing. Subject reached surface @ 1959 feeling well. About 1110 he developed sharp sudden pain in left forearm muscles just below level of elbow which required recompression. Taken to 100 feet. Left surface @ 1111 obtaining complete relief @ 50 ft. Brought out on air Rx table as follows: Left surface 1111 reached 100 ft @ 1113 30 min 80 ft 12 min 30 ft 42 min 60 ft 26 min 20 ft 52 min 50 ft 30 min 10 ft 68 min 40 ft 35 min reached surface @ 1616 Had no further complaints. This subjects threshold for pain is low. He had had bends before on two previous occasions where the same sites were involved (?) left elbow, forearms, wrist area. Subject felt well following dive @ 1055. About 1800 patient noticed slight pain in right wrist. This remained during the evening but subject did not report for recompression thinking that it might disappear. Slept well. Still had slight pain in wrist joint following AM. Lasted to about 1000 and disappeared spontaneously without recompression. No other or further complaints. This subject felt well on surfacing. However about 2 hours afterward he developed mild constant pain in left deltoid area. This became progressively and increasingly more severe - although still of mild character, he was recompressed and obtained complete relief of pain at 25 ft. He was taken to 165 ft following (and testing) the new treatment table and decompressed as follows: Left surface @ 1345 reached 165' @ 1349 remained 30 min 140 ft 12 min 60 ft on O<sub>2</sub> 30 min 120 ft 12 min 50 ft on O<sub>2</sub> 30 min 100 ft 12 min 40 ft on O<sub>2</sub> 30 min 80 ft 12 min to surface in 5 min; reached surface @ 1649 Patient felt well on surfacing. However about 15 min after surfacing pain recurred in left arm which was severe in character. He was again recompressed and relief was obtained at 25 ft. Pressure was increased to 30 ft and decompressed as follows: left surface @ 171- reached 30 ft @ 1713 remained 12 hours 20 ft 2 hours 10 ft 2 hours surfaced @ 0916 12/6/44 On surfacing patient had no complaints and remained symptom free for 24 hours. Note: the recurrence of bends in this case was more severe than his marginal case and probably corroborates our opinion that the treatment table as now prescribed and followed does not provide adequate protection. Proving the table to be inadequate is being done in conjunction with our experiments on surface decompression.</p>
14	DCS	wet/work	-1	11
15	DCS	wet/work	120	425
16	DCS	wet/work	30	120

26	Marginal	wet/work	-65	-60	<p>Rather severe skin bends. Patient developed a patch of skin itch and rash over left anterior chest when he reached the 20 ft stop of his dive. This persisted during the 28 minutes at 20 feet and the 30 min at 10 ft. The rash and itch rapidly spread after surface was reached and within 5-10 min the entire anterior chest on left side and part of right side and the posterior left chest were involved in marblization. Given O<sub>2</sub> at surface for 1/2 hour after his dive. Obtained prompt relief of itching. Residual soreness remained during the rest of the day. The following AM, skin hypersensitivity and tenderness were still present in the left anterior chest area without rash being present. No joint pains were ever present.</p>
27	DCS	wet/work	-65	-60	<p>During decompression stops of 20 and 10 feet this diver noted slight transient symptoms. At 20 feet he noticed slight pain in left triceps area lasting about 2 min without recurrence. At 10 feet he noticed slight pain in hypothenar eminence of right hand which also lasted about 2 min and disappeared without recurrence. Surfaced @ 1013 apparently feeling well. About 40 min after surfacing patient suddenly became dizzy, complained of blurring of vision, and became pale and lacked coordination in walking (stagers). He was immediately taken to the chamber and recompressed at 1057. He states that as soon as he got in chamber before pressure was applied his blurred vision disappeared. During recompression all symptoms disappeared at 20 feet. Taken to 165 and treated as serious case as follows:  Left surface @ 1057 reached 165 @ 1103  165 ft 30 min 60 ft 26 min  140 ft 12 min 40 ft 35 min  120 ft 12 min 30 ft 12 hours  100 ft 12 min 20 ft 2 hours  80 ft 12 min 10 ft 2 hours RS 0603 01/13/45. No further symptoms  Diver completed dive at 1013. Within 5 min patient noted sudden and fairly severe pain in right shoulder in sub-deltoid bursa area. Pain was steady. Recompressed at 1037. Relief obtained at 15 feet. Taken to 100 feet and brought out on short oxygen table as follows:  100 ft 30 min 60 ft 30 min on O<sub>2</sub>  80 ft 12 min 50 ft 30 min on O<sub>2</sub>  40 ft 30 min on O<sub>2</sub> Surfaced on oxygen in 5 min @ 1258  No recurrences. Slight residual ache remaining following AM.</p>
28	DCS	wet/work	-1	5	<p>Severe skin bends.  Patient developed severe itching of skin followed by a typical rash over chest and abdomen about 20 min after dive. This began to spread and finally spread to arms and entire anterior trunk. Patient also had cramps develop in upper abdomen within about 1/2 hour (probably intestinal gas) with nausea. Did not vomit. Itching disappeared in about 2 hours but skin remained tender and sore the rest of that day and the following day. Rash did not completely disappear until 3 days later. There were no other symptoms in this case. No recompression was instituted. Oxygen was contemplated but was not given.</p>
29	DCS	wet/work	-1	20	<p>No serious complaints. Patient felt well after dive except for moderate fatigue. At 1900 he said he suddenly became dizzy and also noticed slight deep pain in right groin. He lay down and fell asleep. No complaints this A.M. Patient noticed slight skin itch over left forearm after surfacing from his recompression dive but this disappeared within 15 min with no further recurrence or development of any rash.</p>
30	Marginal	wet/rest	-1	0	

31	Marginal	wet/rest	-1	0	No complaints. Experienced quite a bit of fatigue post dive. No skin or joint complaints.
32	DCS	wet/work	30	120	This subject developed mild pain in right shoulder in area around deltoid insertion. Came on about 2 hrs after dive. It was mild in nature and patient did not have too much discomfort. Said it felt a little like bends but not like it did on previous cases of bends. Said it felt like after pitching baseball a little too much. This lasted throughout the day and nite. The following day the same mild soreness was still present. He was taken to 100 ft very slowly but obtained no relief. Was brought out on 100 ft oxygen Rx table with soreness still present. The following day about 1500 noticed a new pain develop in his right hand. States his middle finger was weak and painful on movement. On the following AM (3rd day after day of dive) subject could not raise his hand to dress due to soreness in deltoid area and he presented signs of an inflammatory tenosynovitis in the extensor and flexor tendons of his right middle finger. Same pain elicited on wrist extension also. There was swelling over dorsum of hand over middle finger extensor tendon. This tenosynovitis may be independent of his dive but his deltoid pain was probably of bubble origin. Rx given - diathermy and rest. On evening of 3/12 pain became severe. Patient was transferred to USNH Bethesda with a probably diagnosis of tenosynovitis. Later note: Final diagnosis at NH Bethesda in May, Infectious Arthritis, joint of middle finger of right hand.
33	DCS	wet/work	30	181	Subject completed dive at 1014. At 1130 his skin began to itch over arms and back. About 1315 he noticed a reddish blue rash involving anterior abdomen, both shoulders, and medio anterior aspect of both arms. This rash remained throughout the day and residuals remained on the following day. Said he also noticed slight soreness in right knee around patellar ligament and patellar area only on weight bearing, disappearing with rest. Very mild in character. Slight residuals following AM. Said also that he had a mild headache following dive. Thought it was due to not enough ventilation in helmet since he could <i>(sic)</i> get enough air supply due to a noisy non return valve. No other complaints.
34	Marginal	wet/work	-1	0	No complaints. This subject however did develop skin itch and a rash. Itching came on at his 10 ft stop involving both forearms, arms, axillary folds and back. Legs also itched but no rash occurred. On completion of 10 ft stop the itching subsided but returned with increasing severity on reaching surface and lasting for 3 hours. Rash did not completely disappear until 5 hours after dive. The rash was the same type as previously described in this subject. It is not the typical rash often seen in divers. It resembles the rash of measles being discreet in nature - macular and papular in nature varying from pin point to bee bee shot size. No cyanosis. No fatigue or joint symptoms.



Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU545	1.0	1	100.0	85.0	61.0	145.0	166.0	11/06/44 EDU
2	EDU545	0.5	1	100.0	85.0	61.0	145.0	1586.0	02/14/45 EDU
3	EDU545	1.0	1	100.0	85.0	61.0	176.0	236.0	11/24/44 EDU
4	EDU545	1.0	1	100.0	85.0	61.0	176.0	214.0	11/24/44 EDU
5	EDU545	1.0	1	100.0	85.0	61.0	156.0	176.0	11/27/44 EDU
6	EDU545	1.0	1	100.0	85.0	61.0	176.0	274.0	11/27/44 EDU
7	EDU545	1.0	1	100.0	85.0	61.0	156.0	206.0	03/29/45 EDU
8	EDU545	0.5	1	100.0	85.0	61.0	145.0	156.0	03/29/45 EDU
9	EDU545	0.5	1	100.0	85.0	61.0	145.0	1586.0	03/28/45 EDU
10	EDU545	1.0	1	100.0	85.0	61.0	156.0	206.0	03/28/45 EDU
11	EDU545	1.0	1	100.0	85.0	61.0	156.0	191.0	03/28/45 EDU
12	EDU545	1.0	1	100.0	85.0	61.0	176.0	322.0	03/27/45 EDU
13	EDU545	1.0	1	130.0	55.0	77.0	142.0	180.0	12/01/44 EDU
14	EDU545	1.0	1	130.0	55.0	76.0	130.0	142.0	12/01/44 EDU
15	EDU545	1.0	1	130.0	55.0	76.0	251.0	556.0	12/04/44 EDU
16	EDU545	1.0	1	130.0	55.0	76.0	161.0	251.0	12/05/44 EDU
17	EDU545	0.0	1	100.0	85.0	61.0			EDU545 LOG 31
18	EDU545	0.0	13	100.0	85.0	61.0			EDU545 LOG 31
19	EDU545	0.0	3	130.0	55.0	76.0			EDU545 LOG 31
20	EDU545	0.0	2	130.0	55.0	77.0			EDU545 LOG 31
21	EDU545	0.0	2	130.0	55.0	80.0			EDU545 LOG 31
22	EDU545	0.0	2	130.0	55.0	79.0			EDU545 LOG 31
23	EDU545	0.0	5	130.0	55.0	76.0			EDU545 LOG 31
24	EDU545	0.0	2	130.0	55.0	76.0			EDU545 LOG 31
25	EDU545	0.0	1	130.0	55.0	77.0			EDU545 LOG 31
26	EDU545	0.5	1	150.0	38.0	65.0	38.0	43.0	1/11/45 EDU
27	EDU545	1.0	1	150.0	38.0	65.0	38.0	43.0.	1/12/45 EDU

28	EDU545	1.0	1	150.0	38.0	65.0	102.0	108.0	1/12/45 EDU
29	EDU545	1.0	1	150.0	38.0	65.0	102.0	123.0	1/16/45 EDU
30	EDU545	0.5	1	150.0	38.0	98.0	135.0	136.0	2/26/45 EDU
31	EDU545	0.5	1	150.0	38.0	98.0	135.0	136.0	2/26/45 EDU
32	EDU545	1.0	1	170.0	30.0	59.0	119.0	209.0	3/09/45 EDU
33	EDU545	1.0	1	170.0	30.0	59.0	119.0	270.0	3/14/45 EDU
34	EDU545	0.5	1	170.0	30.0	59.0	88.0	89.0	3/16/45 EDU
35	EDU545	0.0	4	150.0	40.0	84.0			EDU545 LOG 32
36	EDU545	0.0	4	150.0	38.0	65.0			EDU545 LOG 32
37	EDU545	0.0	10	150.0	38.0	65.0			EDU545 LOG 32
38	EDU545	0.0	2	150.0	38.0	65.0			EDU545 LOG 32
39	EDU545	0.0	1	150.0	38.0	64.0			EDU545 LOG 32
40	EDU545	0.0	14	170.0	30.0	59.0			EDU545 LOG 32
41	EDU545	0.0	2	170.0	30.0	59.0			EDU545 LOG 32
42	EDU545	0.0	1	170.0	30.0	59.0			EDU545 LOG 32

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<b>SECTION I: SINGLE AIR DIVES</b>
<b>J. NMRNSW2</b>
<ul style="list-style-type: none"><li>• 91 dives: 5 DCS, 5 Marginal</li><li>• All dives were wet; water temperature 50-65° F</li><li>• Dives were conducted during the period May 1988 - January 1989</li><li>• Exercise - bicycle at depth 50% (10 minutes on, 10 minutes off)</li><li>• This data set is included in the report, Statistically Based Decompression Tables VII.</li><li>• Descriptions of DCS manifestations were obtained from the medical files, dive logs and treatment logs for this protocol.</li></ul>
<p>No report was written upon the completion of this study. These dives were part of a 4-element study of helium vs. nitrogen and wet vs. dry. E.D. Thalmann was the Principal Investigator of this NMRI Protocol #88-06 entitled: "Improved Decompression Procedures for Free Swimming Divers II".</p>

## SECTION I: SINGLE AIR DIVES

J. NMRNSW2

91 dives: 5 DCS, 5 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
4	Marginal	122.6	182.6	Felt cold without shivering after surface; no symptoms at surfacing; 2 hrs post dive asymptomatic, reevaluate in AM; Following day reported transient "niggles" of shoulders about 3 hrs after dive, but no sequelae; was very tired. Asymptomatic at the 24 hr check. Dx: niggles
8	DCS	34.4	124.4	("symptoms c/w Type I DCS"). Felt chilled for last 3 min of dive; surfaced with no symptoms; asymptomatic 1.5 hrs post dive. Approx 2 hrs post dive complained of diffuse left upper arm pain increasing to 3/10 over 30 min and remaining constant thereafter; unaffected by movement or muscular effort; recalled no recent or intra-dive activity that could have caused the injury; unable to affect symptoms by external manipulation. Neuro normal. Complete resolution at 57 seconds at 60 FSW TT5
15	Marginal	123.5	193.5	Asymptomatic at surfacing and 2 hrs post dive; approx 3-3.5 hrs post dive complained of 20-30 minute pruritis over forearms bilateral with discoloration; pruritis is transitory, not increasing in severity over past 20 min; no joint discomfort or areas of paresthesias; resolved within 30 minutes
17	Marginal	14.4	34.4	Asymptomatic upon surfacing; 30 min post dive complained of pruritis over medial forearm [no indication of right or left] mild transitory and not associated with paresthesias, discoloration or joint aches; pruritis due to reperfusion and warming or wetsuit, not DCS. Resolved and no complaints 2 hrs later
19	DCS	34.1	97.1	No symptoms upon surfacing - left ear squeeze at 2' on descent; approx 1.5 hrs post dive complained of numbness right upper arm & hand, progressing over 10 min; no associated pain/weakness but triceps feels less reliable than normal; denies trauma during dive; Neuro WLN. Erythematous patchy rash right pectoral area. Dx: Type II DCS a subjective sensory deficit of right triceps and skin over extensive surface of right forearm, wrist, thumb and forefinger. Recompressed 2 hrs post dive; complete relief 20 min at 60 FSW. TT6
22	Marginal	120	1440	Niggles. No complaints upon surfacing; 2 hrs post dive transient itching, migratory without skin discoloration; no pains; at 24 hr follow-up complained of transient migratory aches and pains in muscles of extremities; nothing persistent. Feels muscular fatigue as though strenuous physical workout; played basketball this morning and now feels improved. Neuro WLN.
23	DCS	123.4	363.7	The dive progressed IAW the protocol and all divers had no complaints at both the 15 min and 2 hr checks. At 1830 this diver noted a dull ache in his right knee. At the onset of pain he was lying down. He stood up and noted a dull pain at 1/10 intensity. He tried to "walk it off" and performed household chores. The pain increased over the next hour to an intensity of 5/6. He called the DMO at home at 1930 and the recall was initiated. Diver was examined by DMO at 1945. The pain in his right knee was 5-6/10 and was obviously affecting his gait as he walked to the examination room. There was no swelling of the knee and the range of motion was full. The neurologic exam was unchanged from the pre-dive

23 (cont)				<p>exam. (Awake and oriented. Cranial nerves 2 thru 12 intact. Sensory without deficit except over right lateral malleolus due to surgical scar. This sensory deficit was unchanged from prior to the dive. Motor strength was 5/5 and symmetric. Reflexes: 2+ patellar, brachioradialis and biceps. 0 triceps. Babinski maneuver elicited downward movement of the toes. Cerebellar was intact by finger to nose and heel to shin maneuvers. The gait was normal except for the favoring of the right knee. Toe, heel and tandem walk were normal and Rhomberg was steady.) The initial diagnosis was Type I Decompression Sickness affecting the right knee. The patient was orally rehydrated and given oxygen via face mask at the surface at 1018. Recompression on TT5 was started at 2029. Total relief of symptoms occurred after one minute and 48 seconds at depth on oxygen. The patient was treated on a straight TT5 and reached surface at 2244. During the treatment he consumed 64 fl oz of water and voided 800 cc of light yellow urine. Neurological exams performed throughout the treatment were normal. At the surface the patient remained symptom free. At follow-up 24 hrs post treatment the patient remained symptom free and without complaints.</p>
25	DCS	124.3	514.6	<p>Asymptomatic upon surfacing and at 2 hr post dive check; presented following morning complaining of 5/10 persistent throbbing pain in right knee since 8.5 hrs post dive; unaffected by movement or direct pressure; no trauma during or after dive; feels generally fatigued; Neuro WLN ( note: 3 hrs sleep night before dive; 4-5 hrs/night for previous several nights); complete relief by 10 min @ 60 FSW. TT5</p>
28	DCS	12.7	37.7	<p>Dive was uneventful and divers were OK at the 30 min check. At approx 35 min post dive this diver complained of a pain simulating muscle spasm of his left flank. He reported to sickbay. Over the course of 3-5 minutes his symptoms progressed to include paresthesias of the left side from the left toes to the left chest and back above the nipple line, muscle weakness of the left lower extremity (quadriceps 3/5 according to corpsman's exam, gait grossly affected), perioral numbness and drooling. In the chamber just prior to descent the patient felt lightheaded but denied true vertiginous symptoms. He did not lose consciousness. Due to the severity and rapid progression of symptoms a full neurologic exam was not performed on the surface. Recompression proceeded on 100% oxygen to 60 fsw (TT6). The patient had complete relief after 1 min at the bottom. Two extensions at 60 fsw were performed. At depth vital signs were BP 130/90, P 60 regular, and respirations 16/min. An 18 ga. IV was introduced and NS at a rate of 150 cc/hr was started following a 500 cc bolus. Decadron 10 mg slow IVP was given without incident. A full neurologic exam at 60 fsw was normal. Neuro exams performed just prior to leaving 60 fsw, upon arrival at 30 fsw and at the surface were normal. The patient voided just prior to leaving 60 fsw. Total I/O: 2700/1921. Prior to fluid resuscitation a spin hematocrit was 43. After reaching the surface the patient performed psychomotor testing. The results were unchanged from baseline. The patient was examined by the duty resident neurologist at NHBETH and no abnormalities were found. An IM dose of Decadron 6 mg was given. The patient was followed at NMRI with Q3h checks and the next morning he remained without complaints with a normal neurologic exam. Impression: Type II DCS most likely involving brain stem or cervical/upper thoracic spinal cord.</p>
36	Marginal	30	55	<p>No symptoms or problems when seen at 30 min after surfacing (surface time 1600). At 55 mins after surfacing he was sitting in conference room, became light-headed and vomited. He was able to walk to sick bay where examination revealed no abnormalities. BP was 118/86. His condition improved rapidly while in sick bay and he returned to the conference room. Because he appeared extremely tired sitting in the conference room, he was brought back to sick bay where he was examined. Exam still revealed no significant pathology. Assessment of fatigue and dehydration. No complaints at 24 hour check.</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	nmrnsww2	0.0	3	61.5	81.5	1.7			NSW1C01
2	nmrnsww2	0.0	3	61.5	83.7	1.3			NSW1C02
3	nmrnsww2	0.0	2	61.5	82.3	1.1			NSW1C03
4	nmrnsww2	0.5	1	61.5	82.3	1.1	206.0	266.0	NSW1C03
5	nmrnsww2	0.0	1	61.5	92.3	1.4			NSW1C04
6	nmrnsww2	0.0	3	61.5	92.3	1.2			NSW1C05
7	nmrnsww2	0.0	2	61.5	91.9	1.2			NSW1C06
8	nmrnsww2	1.0	1	61.5	91.9	1.2	127.5	217.5	NSW1C06
9	nmrnsww2	0.0	2	61.5	92.1	1.2			NSW1C07
10	nmrnsww2	0.0	3	61.5	92.1	1.5			NSW1C08
11	nmrnsww2	0.0	2	61.5	92.1	1.3			NSW1C09
12	nmrnsww2	0.0	2	61.5	92.2	1.3			NSW1C10
13	nmrnsww2	0.0	2	61.5	91.9	1.1			NSW1C11
14	nmrnsww2	0.0	2	61.5	102.2	1.3			NSW1C12
15	nmrnsww2	0.5	1	61.5	102.2	1.3	227.0	297.0	NSW1C12
16	nmrnsww2	0.0	1	61.5	102.4	1.1			NSW1C13
17	nmrnsww2	0.5	1	61.5	102.4	1.1	117.9	137.9	NSW1C13
18	nmrnsww2	0.0	2	61.5	106.1	1.3			NSW1C14
19	nmrnsww2	1.0	1	61.5	106.1	1.3	141.5	204.5	NSW1C14
20	nmrnsww2	0.0	2	61.5	101.6	1.3			NSW1C15
21	nmrnsww2	0.0	1	61.5	102.1	1.2			nsw1cl6
22	nmrnsww2	0.5	1	61.5	102.1	1.2	226.7	1546.7	nsw1cl6
23	nmrnsww2	1.0	1	61.5	102.1	1.2	226.7	467.0	nsw1cl6
24	nmrnsww2	0.0	2	61.5	92.2	1.2			NSW1C17
25	nmrnsww2	1.0	1	61.5	92.2	1.2	217.7	608.0	NSW1C17

26	nmrnsw2	0.0	3	61.5	84.2	1.2		nsw1c18
27	nmrnsw2	0.0	1	61.5	82.3	1.1		NSW1C19
28	nmrnsw2	1.0	1	61.5	82.3	1.1	96.1	NSW1C19
29	nmrnsw2	0.0	3	61.5	242.3	1.2	121.1	NSW1E01
30	nmrnsw2	0.0	3	61.5	242.2	1.5		NSW1E02
31	nmrnsw2	0.0	3	61.5	242.8	1.0		NSW1E03
32	nmrnsw2	0.0	3	61.5	302.2	1.4		NSW1E04
33	nmrnsw2	0.0	2	61.5	302.0	1.3		NSW1E05
34	nmrnsw2	0.0	2	61.5	304.3	1.1		NSW1E06
35	nmrnsw2	0.0	1	61.5	303.2	1.4		NSW1E07
36	nmrnsw2	0.5	1	61.5	303.2	1.4	337.8	NSW1E07
37	nmrnsw2	0.0	3	61.5	363.1	1.2	362.8	NSW1E08
38	nmrnsw2	0.0	3	61.5	363.2	2.3		NSW1E09
39	nmrnsw2	0.0	3	61.5	363.1	1.2		NSWE10
40	nmrnsw2	0.0	2	61.5	360.1	1.1		NSWE11
41	nmrnsw2	0.0	3	61.5	362.6	1.2		NSWE12
42	nmrnsw2	0.0	3	61.5	362.2	1.1		NSW1E13
43	nmrnsw2	0.0	3	61.5	363.9	1.1		NSW1E14
44	nmrnsw2	0.0	3	61.5	93.1	1.1		NSWF01
45	nmrnsw2	0.0	2	61.5	93.1	1.2		NSW1F02



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## SECTION I: SINGLE AIR DIVES

### K. PASA

- 72 dives: 5 DCS, 2 Marginal
- All dives were wet; water temperatures (+2° F) were determined by time as follows:
  - ≤ 90 mins 55° F
  - 91-200 mins 60° F
  - 201-300 mins 65° F
  - 301-480 mins 70° F
  - > 480 mins 75° F
- Dives were conducted during the period March - June 1991
- Exercise - 50% work/rest cycle at depth on bicycle ergometer
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of DCS manifestations were obtained from reference 2 and, in some cases, the medical files.

1. PC Kelleher, ED Thalmann, SS Survanshi, PK Weathersby. Verification Trial of a Probabilistic Decompression Model. NEDU, Panama City, FL and NMRI, Bethesda, MD. UHMS Annual Scientific Meeting 23-27 June 1992.
2. Statistically Based Decompression Tables XI: Manned validation of the LE probabilistic decompression model for air and nitrogen-oxygen diving. ED Thalmann, PC Kelleher, SS Survanshi, EC Parker, PK Weathersby. Joint Technical Report, NEDU #1-99 and NMRC #99-01, Naval Medical Research Center, Bethesda, MD. January 1999.

## SECTION I: SINGLE AIR DIVES

### K. PASA

72 dives: 5 DCS, 2 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
3	Marginal	61.5	121.5	Noted transient sharp pain < 10 sec in medial aspect of right knee at 1330 after dive and lateral aspect of right ankle at 1400; reported the following day via telephone; DMO impression: niggles
6	Marginal	121.1	241.1	Asymptomatic upon reaching surface; evening after dive experienced "niggles" back of right arm radiating to hand - lasted approx one hour on and off then went away.
7	DCS	61.1	961.1	Type I. Complained of very mild (1-2/10) left anterior knee pain starting approx 15.5 hrs post dive; at 20 min post dive he had complained of one transient "niggle" lasting 10 sec in the right ankle; TT5 with complete relief upon reaching 60 fsw
8	DCS	121.1	721.1	Type II. Asymptomatic upon surfacing; approx 12 hrs post dive woke with pins & needles sensation in left arm distributed from axilla down posterior part of arm to small and index fingers and lateral aspect of middle finger; no other symptoms; TT6 some relief with decreased pain in arm after first O <sub>2</sub> period; sensation in fingertips is normal, still has dull pain in wrist, back of hand and arm just below axilla; after second O <sub>2</sub> period further relief reported but still some slight pain in back of left hand; slight pain on back of left hand persist after 3rd O <sub>2</sub> period; total: TT6 with 2 extensions at 30 fsw; symptoms-free until travel from 60 to 30 fsw when recurrence of abnormal sensation in left arm and wrist and hand; symptoms cleared during first O <sub>2</sub> period and did not return.
11	DCS	121.2	631.2	Type II. Asymptomatic upon surfacing; approx 10 hrs post dive experienced right elbow pain, consistent at 2-3/10 and progressed to include decreased sensation of right arm/hand distal to right elbow; distribution to include entire dorsal and ventral surfaces; TT6 complete relief.
20	DCS	122.3	4322.3	(from memo dtd 14 JUN 91); did a 150 on Monday 03 Jun, stated he was "colder than the other divers after the dive"; noted transient migratory pains after dive, similar to previous dives (100 fsw reps) on Wed of the week before; these resolved completely; flew back to Panama City on Thursday 06 June, developed left knee pain en route at 1530 hrs; pain persisted; presented to medical at NDSTC Friday a.m. was found to have a 15 cm diameter area of numbness over left patella; treated at 60 fsw on O <sub>2</sub> ; pain resolved during first O <sub>2</sub> period; two extensions on O <sub>2</sub> at 60 fsw, numbness resolved during 2nd O <sub>2</sub> ext. Brought out on TT6, one O <sub>2</sub> ext at 30 fsw. Asymptomatic on reaching surface and following morning. Chronological record also indicates migratory pains, itching & tingling over extremities shortly after surfacing and continuing at a transient, low level; knee pain in-flight described as 1.5/10; DMO note: impression Type II DCS.
24	DCS	-2.0	13.1	Left shoulder pain 12 min post first dive; TT6 81 min, partial relief on descent (no medical file available for this diver).

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	PASA	0.0	4	101.5	59.8	112.0			PAA0E01
2	PASA	0.0	3	101.5	61.1	112.1			PAA0E02
3	PASA	0.5	1	101.5	61.1	112.1	234.6	294.6	PAA0E02
4	PASA	0.0	4	101.5	59.8	112.2			PAA0E03
5	PASA	0.0	1	101.5	59.9	113.3			PAA0E04
6	PASA	0.5	1	101.5	59.9	113.3	294.3	414.3	PAA0E04
7	PASA	1.0	1	101.5	59.9	113.3	234.3	1134.3	PAA0E04
8	PASA	0.0	3	101.5	59.8	112.1			PAA0E05
10	PASA	0.0	3	101.5	59.8	112.1			PAA0E06
11	PASA	1.0	1	101.5	59.8	112.1	293.1	803.1	PAA0E06
12	PASA	0.0	4	101.5	59.8	111.8			PAA0E07
13	PASA	0.0	4	151.5	30.2	130.7			PAA0F01
14	PASA	0.0	4	151.5	29.8	127.3			PAA0F02
15	PASA	0.0	4	151.5	29.9	128.1			PAA0F03
16	PASA	0.0	4	151.5	30.1	127.4			PAA0F04
17	PASA	0.0	4	151.5	29.8	127.8			PAA0F05
18	PASA	0.0	4	151.5	30.0	82.8			PAA0I01
19	PASA	0.0	3	151.5	30.0	83.0			PAA0I02
20	PASA	1.0	1	151.5	30.0	83.0	235.3	4435.3	PAA0I02
21	PASA	0.0	4	151.5	30.0	82.9			PAA0I03
22	PASA	0.0	4	151.5	29.9	82.9			PAA0I04
23	PASA	0.0	4	151.5	30.0	79.6			PAA0I05
24	PASA	1.0	1	101.5	34.8	3.1	35.9	51.0	PAA1D01AD
25	PASA	0.0	2	101.5	37.7	2.4			PAA1D03AB
26	PASA	0.0	2	101.5	36.4	3.3			PAA1D04AB

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## **SECTION I: SINGLE AIR DIVES**

### **L. SUBX87**

- 58 dives: 2 DCS, 0 Marginal
- All dives were wet; performed in open water. Water temperature was not reported, however, these were open water dives that took place in Norway so it was most likely cold.
- Dives were conducted during the period 13-24 July 1987
- Exercise - none
- This data set is included in the report, Statistically Based Decompression Tables VII
- Descriptions of DCS manifestations were obtained from references 1 and 2.

1. RC Whiteside. Submarine escape trials DEEP ESCAPE 87, 13-24 July 1987. Reported in FOSM letter 4411/4/23MR of 10 August 1987.
2. JR Haydon and MJ Fox. Medical Report on the Deep Submarine Escape Exercise 1987. Institute of Naval Medicine Report 8/88; 31 May 1988.
3. RR Pearson. Medical considerations - DEEP ESCAPEX 1987. In: Proceedings of the 7th Tripartate Meeting on Submarine Medicine, 1989.

## SECTION I: SINGLE AIR DIVES

L. SUBX87

58 dives: 2 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
49	-1.0	3.0	Localized paresthesia of left foot, slight weakness of leg; Type 2 decompression sickness developed 3 mins after surfacing. Treated on RN Table 62. Did not report to the MO until approx 20 min after escape when he reported that about 3 min after surfacing he had noticed abnormal sensation over the medial aspect of the right foot. By the time he presented for examination, there was an obvious lack of proprioception in the right foot and it was observed that he caught his foot when negotiating steps. Detailed exam revealed a poor heel to toe gait, enhanced pinprick sensation over the medial aspect of the right foot although sensation to light touch was normal. Absent joint position sense in the right first metatarsophalangeal joint. No motor deficiency and lower limb reflexes were normal with flexor plantar responses. Also had bilateral perforated tympanic membranes. Therefore, he appeared to have an L5/S1 lesion, a type 2 neurological decompression sickness. While being examined, another case arrived [not DCS] and was immediately recompressed to 50 msw [164 fsw] - this type 2 case was added to the chamber after it arrived back at 18 msw [60 fsw]; this patient was decanted to the outer compartment with the MO to accommodate the time difference between the tables. No immediate relief at 18 msw, although within one hour he gradually became aware that the sensation in his foot has returned to normal. Full neuro exam on completion of Table 62 revealed no abnormality. Follow-up report from the Lung Function Unit, Brompton Hosp, London; 04 Aug 87: flow volume loops are slightly better than normal in all respects; total lung capacity (TLC), measure by whole-body plethysmography, is slightly larger than normal but there is no evidence of a gross emptying defect in the lung and it is mechanically normal. Whole lung function studies are WNL. CT scans at full inflation and residual volume show no significant abnormality. There are no objective grounds to bias the differential diagnosis towards lung rupture; however, the findings do not exclude it. Taking all things into consideration, the more likely diagnosis is decompression sickness.
57	-1.0	10.2	<p>Type 2 decompression sickness developed 20 min after surfacing. Treated on RN Table 63. Was the first subject to conduct an escape from 180 msw [590 fsw]; Approx 10 min after surfacing he noticed a heaviness on the left side of his face and by 20 min he reported these symptoms as he thought they were deteriorating. A rapid exam in the immediate vicinity of the chamber revealed an obviously ill man; he was pale and sweaty with marked VIIth and XIIth nerve paresis; in the presence of these physical signs exam was discontinued and the decision made to continue the exam under pressure. He was recompressed without further delay to 50 msw [164 fsw] with a MO in attendance and on arrival all symptoms and signs had resolved. Initial thoughts were that this was cerebral arterial gas embolism so he was treated with RN Table 63.</p> <p>Follow-up report from the Lung Function Unit, Brompton Hosp, London; 04 Aug 87: flow volume loops are slightly better than normal in all respects. TLC is slightly larger than normal but there is no gross emptying defect in the lung and it is mechanically normal. Volume of alveolar gas that can be reached by a single vital capacity inhalation of helium tracer in 10 seconds (VA) and the volume of haemoglobin reached by inhaled carbon monoxide in 10 sec (TLCO) are both outside the range of average values. VA is slightly less than average for normal people of his age and may be an early indication of small airways damage from previous smoking (he is an ex-smoker) or may be related to the following finding which is definitely abnormal. TLCO is slightly above normal, but more particularly the transfer per litre of accessible gas volume (TLCO/VA = KCO) is significantly raised. The differential diagnosis includes asthma, where it is believed that hypoxic vasoconstriction diverts blood to ventilated lung and inspiratory effort may augment it; externally restricted lung inflation, where the pulmonary capillary bed is normal but cannot be 'diluted' by air sufficiently; and lung haemorrhage where spilt blood can absorb additional carbon monoxide. There is not evidence of asthma or restricted inflation so the possibility of recent bleeding has to be considered; this would favor pulmonary barotrauma.</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	SUBX87	0.0	1	80.7	0.5	0.2			15xax1w.dat
2	SUBX87	0.0	1	80.7	0.5	0.2			15xax2s.dat
3	SUBX87	0.0	1	85.6	0.5	0.2			15xax5y.dat
4	SUBX87	0.0	1	83.2	0.6	0.2			15xax8x.dat
5	SUBX87	0.0	1	105.3	0.6	0.2			15xb10v.dat
6	SUBX87	0.0	1	107.8	0.6	0.2			15xb14s.dat
7	SUBX87	0.0	1	105.3	0.7	0.2			15xbx1u.dat
8	SUBX87	0.0	1	102.9	0.5	0.2			15xbx2r.dat
9	SUBX87	0.0	1	105.3	0.8	0.2			15xbx3z.dat
10	SUBX87	0.0	1	105.3	1.3	0.2			15xbx4w.dat
11	SUBX87	0.0	1	107.8	0.9	0.3			15xbx8x.dat
12	SUBX87	0.0	1	97.9	0.5	0.3			15xbx9y.dat
13	SUBX87	0.0	1	307.1	0.5	0.5			16xax2z.dat
14	SUBX87	0.0	1	304.6	0.6	0.6			16xax4v.dat
15	SUBX87	0.0	1	302.2	0.9	0.6			16xax5r.dat
16	SUBX87	0.0	1	302.2	1.0	0.6			16xax6x.dat
17	SUBX87	0.0	1	307.1	0.6	0.6			16xax8y.dat
18	SUBX87	0.0	1	299.7	1.1	0.9			16xax9t.dat
19	SUBX87	0.0	1	307.1	0.6	0.5			16xaxdw.dat
20	SUBX87	0.0	1	297.2	0.6	0.6			16xbx1v.dat
21	SUBX87	0.0	1	297.2	0.8	0.5			16xbx2z.dat
22	SUBX87	0.0	1	302.2	1.1	0.5			16xbx3w.dat
23	SUBX87	0.0	1	292.3	0.7	0.5			16xbx4t.dat
24	SUBX87	0.0	1	307.1	0.8	0.6			16xbx8y.dat
25	SUBX87	0.0	1	299.7	0.9	0.6			16xbxau.dat
26	SUBX87	0.0	1	294.8	0.8	0.5			16xbxcx.dat



27	SUBX87	0.0	1	302.2	1.0	0.5	16xbxdr.dat
28	SUBX87	0.0	1	410.4	0.6	0.8	18xax1v.dat
29	SUBX87	0.0	1	376.0	0.4	0.7	18xax2z.dat
30	SUBX87	0.0	1	395.7	0.8	0.7	18xax3w.dat
31	SUBX87	0.0	1	393.2	0.5	0.8	18xax5t.dat
32	SUBX87	0.0	1	393.2	0.5	0.7	18xax9u.dat
33	SUBX87	0.0	1	395.7	0.5	0.7	18xaxax.dat
34	SUBX87	0.0	1	400.6	0.8	0.7	18xaxby.dat
35	SUBX87	0.0	1	390.7	0.5	0.8	18xbx1v.dat
36	SUBX87	0.0	1	390.0	0.5	0.7	18xbx4y.dat
37	SUBX87	0.0	1	398.1	0.6	0.8	18xbx7t.dat
38	SUBX87	0.0	1	400.6	0.4	1.1	18xbx8u.dat
39	SUBX87	0.0	1	403.1	0.9	0.7	18xbxax.dat
40	SUBX87	0.0	1	383.4	0.6	0.8	18xbxbw.dat
41	SUBX87	0.0	1	395.7	0.5	0.7	18xbxcr.dat
42	SUBX87	0.0	1	464.6	0.9	1.0	20xax1z.dat
43	SUBX87	0.0	1	499.0	0.6	1.0	20xax2x.dat
44	SUBX87	0.0	1	511.3	0.5	1.0	20xax3v.dat
45	SUBX87	0.0	1	459.6	0.6	1.0	20xax5s.dat
46	SUBX87	0.0	1	481.8	0.6	1.0	20xax6r.dat
47	SUBX87	0.0	1	489.2	0.6	0.9	20xax8u.dat
48	SUBX87	0.0	1	484.3	0.6	1.1	20xbx1w.dat
49	SUBX87	1.0	1	506.4	0.5	0.5	20xbx2v.dat
50	SUBX87	0.0	1	503.9	0.3	1.0	20xbx3x.dat
51	SUBX87	0.0	1	499.0	0.5	1.1	20xbx5z.dat
52	SUBX87	0.0	1	484.3	0.6	1.0	20xbx7v.dat(cx1v)
53	SUBX87	0.0	1	501.5	0.6	1.0	20xbx8x.dat(cx2x)
54	SUBX87	0.0	1	481.8	0.6	1.0	20xbx9z.dat(cx3z)
55	SUBX87	0.0	1	491.6	0.6	0.9	20xbxaw.dat(cx4w)
56	SUBX87	0.0	1	494.1	0.6	0.9	20xbxbu.dat(cx5u)
57	SUBX87	1.0	1	580.2	0.6	0.8	22xax1u.dat
58	SUBX87	0.0	1	602.4	0.6	1.4	22xax2x.dat

## **SECTION I: SINGLE AIR DIVES**

### **M. EDU1157**

- 46 dives: 15 DCS, 6 Marginal
- All dives were dry.
- Dives were conducted during the period November 1956 - June 1957
- Exercise - none; all dives were made with the divers at rest.
- Descriptions of DCS manifestations were obtained from reference 1 and the archived dive logs at NEDU; names were commonly indicated in the log book notations, but were replaced in this report with "diver" or "subject"
- This data set is included in the report, Statistically Based Decompression Table I.
- Diagnoses of DCS were initially made based on the descriptions by Workman in ref (1). With the additional information from the dive logs, re-diagnoses were made in October 1996 using the criteria established by Weathersby in 1988 (Appendix A). The re-diagnoses were made by a collective decision of the following:
  - CDR Charles Auker MC USN
  - LCDR Robert Ball MC USNR
  - LCDR Charles Toner MC USN
  - LCDR Daniel Valaik MC USN

1. Workman, RD. Calculation of Air Saturation Decompression Tables. Navy Experimental Diving Unit (U.S. Naval Gun Factory, Washington, D.C.) Research Report #11-57. 20 June 1957

# SECTION I: SINGLE AIR DIVES

M. EDU1157

46 dives: 15 DCS, 6 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms	
				from Log Book	From Report
3	DCS	120	270	no comment in Log	Five of six subjects exposed for 120 minutes were symptom-free. One subject had pruritis during decompression and 4.5 hrs later experienced dull pain in his left knee lasting several hours. This subsided without recompression.
5	Marginal	30	90	no comment in Log	...pruritis during decompression. ... complained of pain in an ankle 1.5 hrs after surfacing, which subsided without treatment.
6	DCS	120	360	Pain in groin right leg Table II; Rx began 0312 hrs (065 mins after surfacing) @ 20 ft (1 min) complete relief	...pruritis during decompression. ... had onset of knee pain 6 hours after surfacing. Treatment was carried out on treatment table two without recurrence or residual symptoms.
8	Marginal	-180	1440	no comment in Log	..... complained of mild knee pain/ankle which subsided spontaneously
9	Marginal	-180	1440	no comment in Log	..... complained of mild knee pain/ankle which subsided spontaneously
10	Marginal	-180	1440	no comment in Log	..... complained of mild knee pain/ankle which subsided spontaneously
11	DCS	120	240	Subject had onset of dull pain in both knees about 4 hours after surfacing from dive. Complete relief at 52 feet. No muscle weakness, loss of reflexes or sensations. Rx began 2318 (363 mins after surfacing); @20ft (25 sec) partial relief; @ 52ft (1 min 10 sec) complete relief.	

11 (cont)				One subject complained of knee pain four hours after surfacing. Treatment was carried out on treatment table two with no residual symptoms or recurrence.
12	DCS	-10 sec	20	<p>Pain in both legs with impression of mild weakness about 2 hrs after surfacing. Table 3. Rx began 2042 (177 mins after surfacing). Diver relieved of pain (except in left hip) at 58 ft. Hip reported normal at 150 feet. Felt that legs also became stronger.</p> <p>...presented symptoms within 20 minutes after surfacing which required treatment on treatment table three.</p> <p>... had knee pain</p> <p>...presented decreased muscle strength on both legs</p> <p>...no residual symptoms or recurrence after treatment</p>
13	DCS	-10 sec	20	<p>Mild pain in left knee and upper calf 5 min after surfacing. Rash, right shoulder &amp; abdomen &amp; blurring of vision in right eye noted about 1 hr later. Visual defect cleared within about 10 min. Onset of definite dizziness followed shortly. Table 3. Rx began 1855 (70 mins after surfacing). Wiley relieved of leg pain at 60 ft, dizziness at 70 ft.</p> <p>... presented symptoms within 20 minutes after surfacing which required treatment on treatment table three.</p> <p>... had knee pain</p> <p>...complained of dizziness and presented limitation of visual fields and nystagmus</p> <p>... no residual symptoms or recurrence after treatment</p>
14	Marginal	0	720	<p>no comment in log</p> <p>...onset of transient dull leg pain several hours after surfacing, which subsided spontaneously without treatment.</p>
15	Marginal	0	720	<p>no comment in log</p> <p>...onset of transient dull leg pain several hours after surfacing, which subsided spontaneously without treatment.</p>
16	DCS	-10 sec	10	<p>Reported itch &amp; rash over upper abdomen immediately on surfacing. Within 10 minutes, he had deep pain in that area aggravated by deep breathing and bending over. Complete relief at 30 ft. Table 2 used mainly because of type of dive. Delay in reaching 165' due to trouble equalizing ear. Rx began 20:04 (90 mins after surfacing); @10ft (50 sec) partial relief; @30ft (2 min) complete relief.</p> <p>...complained of upper abdominal pain</p> <p>...onset of symptoms was within 10 minutes after surfacing</p> <p>...treated on treatment table two</p> <p>...presented generalized muscle tenderness and epigastric tenderness 6 to 8 hours after treatment, but this cleared without further recompression</p>

17	DCS	-10 sec	3	<p>Developed pain in right ankle &amp; hip within 3 min after surfacing. Pain in both knees also in about 30 min. Relief at 24 ft. but Table 2 used because of nature of dive and rapidity of onset &amp; number of symptoms. Rx began 1920 (74 mins after surfacing). @10' (20 min 20 sec) partial relief; @ ??? leaving 10 ft (2? min 50 sec cannot read entry) complete relief. (note to see Rx of recurrence; p. 275); Bends Recurrence - Table III. Pain in left knee. Rx began 0520 (18 Jan 57); started relief 20' to 25 ft. Complete relief at 30 ft. Went down to 60 ft &amp; came out on Table III.</p> <p>-----</p> <p>...complained of ankle and knee pain; ...onset of symptoms within 10 min after surfacing; ...treated on treatment table 2; had a recurrence of these symptoms 4 hours later. Treatment of this recurrence was carried out on treatment table 3 with freedom from residual symptoms and further recurrence.</p> <p>Diver has onset of pain in both knees and lower back at about 0430 (approx 559 min after surfacing) today awakening from sleep. No change in reflexes, sensations or muscle strength. Rx began 0518 (607 mins after surfacing). He was taken slowly to 165 feet where pain increased in right mid thigh. This became more severe so that it was necessary to reduce pressure to try to relieve pain of tissue squeeze. Reduced gradually to 60 feet but pain still moderately severe. Gave Demoral 100 mpm i.m. for pain. Pain relieved after 10 or 15 minutes and able to descend slowly to 100 feet without increase of pain, then on to 165 feet slowly. (no further notations of relief)</p> <p>-----</p> <p>... was locked into the igloo to finish decompression as he was symptom-free</p> <p>...complained of pain in both knees and lower back ten hours after surfacing from the dive. He was recompressed slowly to 165 feet with no improvement of symptoms. In fact, he noted onset and progressive increase of pain in his right mid-thigh during recompression. He had no complaint of pain in the area before recompression. It was necessary to give him 100 mgm of Demerol for relief of this severe pain, even though pressure had been decreased to 60 feet without improvement in an attempt to decrease a possible tissue squeeze around the bubble. It was then possible to recompress him very slowly to 165 feet and carry out treatment on treatment table three. He noted residual pain in his right thigh, but had no recurrence of symptoms.</p> <p>Diver has rash at 20 ft &amp; upon reaching 10 ft had pain in knee leg &amp; hip; Rx began 1714 (prior to surfacing); @30ft (40 sec) partial relief; @46ft (2 min 25 sec) complete relief.</p> <p>(new Rx described on separate page in log)</p> <p>30 Jan 57 Diver had sudden sharp pain below right knee lasting 3 or 4 minutes at 10:30 p.m. 29 Jan 57. He had no further symptoms (18 hrs after surfacing) until awakened after 0500 with dull pain below right knee some numbness on lateral &amp; medial calf in middle 1/3 over area of dull pain. No relief on 16 minutes descent to 165' or 30 min at 165 not felt to be a recurrence. Brought up on Table II plus 3 1/2 hours O<sub>2</sub> at 30', 20', 10'; some relief of pain during 50 foot stop; relief of numbness during 30 foot stop; mild tenderness below right knee cap. no numbness of right anterior leg and no pain on surfacing. O<sub>2</sub> used for 120 min at 30', 60 min at 20' and 10' since symptoms did change.</p> <table><tr><td>Left 30'</td><td>7'34"52sec</td><td>15:25:52</td></tr><tr><td>Reached 20'</td><td>7'35"02sec</td><td>15:26:02</td></tr><tr><td>Left 20'</td><td>9'15"02sec</td><td>17:06:02</td></tr><tr><td>Reached 10'</td><td>9'15"12sec</td><td>17:06:12</td></tr><tr><td>Left 10'</td><td>11'20"12sec</td><td>19:11:12</td></tr></table>	Left 30'	7'34"52sec	15:25:52	Reached 20'	7'35"02sec	15:26:02	Left 20'	9'15"02sec	17:06:02	Reached 10'	9'15"12sec	17:06:12	Left 10'	11'20"12sec	19:11:12
Left 30'	7'34"52sec	15:25:52																	
Reached 20'	7'35"02sec	15:26:02																	
Left 20'	9'15"02sec	17:06:02																	
Reached 10'	9'15"12sec	17:06:12																	
Left 10'	11'20"12sec	19:11:12																	
18	DCS	120	607																
19	DCS	-313	-125																

19 (cont)				<p>Reached Surf 11'20"22sec (after the Rx description above, a page had obviously been torn out of the log book)</p> <p>...one diver developed mottled rash over abdomen on coming to the 30 foot stop. This disappeared during the stop, but recurred on coming to the 20 and 10 foot stops. Upon reaching the 10 foot stop, he complained of severe pain in his right hip and knee.</p> <p>...was treated on treatment table three and was symptom-free on surfacing. However, he again complained of pain in his right knee 18 hours after surfacing from treatment. He was recompressed and retreated on treatment table three, but had no relief after 30 minutes at 165 feet. He had persistence of pain until finishing 30 minutes of oxygen breathing at 60 and 50 feet, respectively. The pain was completely relieved after finishing an additional 30 minutes of oxygen breathing at 40 feet. He had no residual symptoms.</p>
20	DCS	-10 sec	20	<p>Pain left thigh left knee and left foot started about 20 min after surfacing. No numbness, loss of reflexes, sensation or muscle weakness. Rx began 2050 (75 min after surfacing); @8 ft (40 sec) partial relief for a time then pain returned; @35 ft (4 min 40 sec) complete relief except for area around ankle left foot; @60ft (9 min 35 sec) no change in ankle; @60ft (12 min 55 sec) complete relief after 11 min 45 sec at 60 ft; @165ft (30 min) after 8 min at 165 complained of pain in thigh when standing up; total time of Rx 18 hr 59 min</p> <p>...one subject complained of dull pain in his left knee, thigh and foot 20 minutes after surfacing. He was treated on treatment table three in view of the recurrences of symptoms previously encountered in treating decompression sickness occurring from these long exposures less than 4 to 6 hours after surfacing. He had no residual symptoms or recurrence after treatment.</p>
21	DCS	120	600	<p>Pain left shoulder started up about 10 hours after surfacing, slight at first, increased somewhat over next 2 hours. No muscle weakness, loss of sensation or reflexes. Rx 0755 (740 min after surfacing) Table II; no change in pain after 30 min at 165'; some relief of pain during 120 ft stop; at 60' stop (1 hr 23 min) still some pain; twitching of facial muscles after 24 min at 50' placed on HEO<sub>2</sub> - complete relief after 20 min at 40'. No symptoms on surfacing. There was no reduction of pain during 30 min at 165 ft. Pain reduced somewhat during the 120ft stop on Table II. At 60 ft there was some mild pain in left shoulder area. Patient developed twitching of facial muscle while breathing O<sub>2</sub> after 24 min at the 50' stop. Shifted to HEO<sub>2</sub> - 20% for remainder of 50 foot stop and all of the 40 foot stop (30 m) cont. HEO<sub>2</sub> for 1 hr on the 30 foot stop then one hr O<sub>2</sub> cont. breathing O<sub>2</sub> for 1 hr at 20 ft and one hr at 10 ft complete relief of pain occurred after 20 min at 40 foot stop.</p> <p>...remained symptom-free for 11 hours after surfacing, then complained of dull pain in his left shoulder. He was treated on treatment table two but had little relief of the dull pain until he had finished 30 minutes of oxygen breathing at 60 and 50 feet, respectively. He was given oxygen for 2 hours at 30 feet, and 1 hour at 20 feet and at 10 feet in addition to insure complete resolution of his symptoms.</p>

23	DCS	30	120	<p>Pains in left knee and left hip Table III; Rx began 2344 (203 min after surfacing) Slight relief at 30' Complete relief at 45'</p> <p>...knee and hip pain in one subject two hours after surfacing. He was treated uneventfully on treatment table three. This subject complained transient knee pain after the 120 minutes dive which produced no symptoms in other subjects.</p>
24	DCS	-10 sec	20	<p>Pain in both knees (Does not indicate what treatment table) Treatment began 2011 (15 min after surfacing) no relief at 30' (+1 min 45 sec) complete relief (little weakness in knees) at 50' (+5 min 25 sec)</p> <p>...produced knee pain in subject about 20 minutes after surfacing. He was treated uneventfully on treatment table three. This subject had knee pain requiring treatment after the first and third trials on the 240 minute dive.</p>
26	DCS	-700	1440	<p>No comment in log</p> <p>One subject complained of dull pain in one knee which lasted several hours, but subsided without treatment.</p>
27	DCS	120	360	<p>(Does not indicate a description of symptoms at the top of the treatment page in the log as did the others) Table 100-25 O=2007 TBT=13 min Treatment began 20:07 (387 min after surfacing) Complete relief in right ankle and left knee partial relief in right knee at 30' (+4 min 50 sec) Almost all gone in right knee at 58' (+6 min 50 sec) Complete relief at 100' (+12 min 45 sec) Right knee a little weak at 165' (+14 min 40 sec)</p> <p>...experienced pain in his right knee and left ankle, 6 hours after surfacing from the dive. He was treated on treatment table three with no residual symptoms or recurrence.</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	edu1157	0.0	6	140.0	90.0	175.3			EDU1157N 1 REPETS=1
2	edu1157	0.0	5	140.0	120.0	233.3			EDU1157N 7 REPETS=1
3	edu1157	1.0	1	140.0	120.0	233.3	473.3	623.3	EDU1157N 7 REPETS=1
4	edu1157	0.0	4	140.0	180.0	306.3			EDU1157N 13 REPETS=1
5	edu1157	0.5	1	140.0	180.0	306.3	516.3	576.3	EDU1157N 13 REPETS=1
6	edu1157	1.0	1	140.0	180.0	306.3	606.3	846.3	EDU1157N 13 REPETS=1
7	edu1157	0.0	2	140.0	180.0	364.3			EDU1157N 19 REPETS=1
8	edu1157	0.5	1	140.0	180.0	364.3	180.0	1984.3	EDU1157N 19 REPETS=1
9	edu1157	0.5	1	140.0	180.0	364.3	180.0	1984.3	EDU1157N 19 REPETS=1
10	edu1157	0.5	1	140.0	180.0	364.3	180.0	1984.3	EDU1157N 19 REPETS=1
11	edu1157	1.0	1	140.0	180.0	364.3	664.3	784.3	EDU1157N 19 REPETS=1
12	edu1157	1.0	1	140.0	240.0	353.3	593.2	613.3	EDU1157N 25 REPETS=1
13	edu1157	1.0	1	140.0	240.0	353.3	593.2	613.3	EDU1157N 25 REPETS=1
14	edu1157	0.5	1	140.0	240.0	421.3	661.3	1381.3	EDU1157N 27 REPETS=1
15	edu1157	0.5	1	140.0	240.0	421.3	661.3	1381.3	EDU1157N 27 REPETS=1
16	edu1157	1.0	1	140.0	240.0	421.3	661.2	671.3	EDU1157N 27 REPETS=1
17	edu1157	1.0	1	140.0	240.0	421.3	661.2	664.3	EDU1157N 27 REPETS=1
18	edu1157	1.0	1	140.0	240.0	440.3	800.3	1287.3	EDU1157N 31 REPETS=1
19	edu1157	1.0	1	140.0	240.0	440.3	367.7	555.2	EDU1157N 31 REPETS=1
20	edu1157	1.0	1	140.0	240.0	489.3	729.2	749.3	EDU1157N 33 REPETS=1
21	edu1157	1.0	1	140.0	240.0	489.3	849.3	1329.3	EDU1157N 33 REPETS=1
22	edu1157	0.0	4	140.0	240.0	517.3			EDU1157N 35 REPETS=1
23	edu1157	1.0	1	140.0	240.0	517.3	787.3	877.3	EDU1157N 35 REPETS=1
24	edu1157	1.0	1	140.0	240.0	517.3	757.2	777.3	EDU1157N 35 REPETS=1
25	edu1157	0.0	4	140.0	360.0	700.3			EDU1157N 41 REPETS=1
26	edu1157	1.0	1	140.0	360.0	700.3	360.0	2500.3	EDU1157N 41 REPETS=1
27	edu1157	1.0	1	140.0	360.0	700.3	1180.3	1420.3	EDU1157N 41 REPETS=1



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## **SECTION II: SINGLE NON-AIR DIVES**

### **A. NMR8697**

- 477 dives: 11 DCS, 18 Marginal
- All dives were wet; water temperatures were 69-72°F, (for some of the 240 minute dives the water temp was increased to 76°F.)
- Dives were conducted during the period April 1983 - December 1985.
- Exercise was performed on a sled ergometer at a standard work rate in a sitting position; 5 minutes of work 3 minutes of rest. For the long dives there was an additional 10 minutes of rest after each hour.
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Manifestation descriptions were taken from reference (1) and the archived medical folders at NMRI.

1. Weathersby PK, Hart B, Flynn ET, Walker WF. Human Decompression Trial in Nitrogen-Oxygen Diving. NMRI Technical Report #86-97, September 1986.

2. Weathersby PK, Hart B, Flynn ET, Walker WF. Role of Oxygen in the Production of Human Decompression Sickness. Journal of Applied Physiology, 63:2380-2387. 1987

## SECTION II: SINGLE NON-AIR DIVES

A. NMR8697 477 dives: 11 DCS, 18 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
6	DCS	120	240	Dull left upper arm pain beginning about 4 hrs after surfacing. Tender to palpation, otherwise exam normal. Standard TT6 brought 50% relief in 5 mins, complete relief within an hour.
7	Marginal	60	120	Brief (half min) ache in left forearm at two hrs after surfacing; 2-3 min pain in left elbow at 3.5 hrs; normal exam, no treatment.
9	Marginal	120	360	Four episodes of transient (5-10 min) aches in right shoulder and elbow and left knee over 3 hr period evening after diving; normal exam following day.
15	Marginal	5	60	Beginning about one hour after surfacing, had four episodes of dull aches in right knee, right shoulder, left elbow, lasting about 3 min each; last episode ended about 4 hrs post dive. exam normal
44	Marginal	60	120	Blotchy, dusky, patchy skin rash over anterior chest and upper abdomen and near left axilla about two hours after surfacing; not itchy or painful; reported very transient (< 1 min) ache in right shoulder. Rash spread, then faded over following hour. Normal Neuro exam.
58	DCS	120	240	Normal exam 2 hrs after surfacing. About 4 hrs post dive experienced marked fatigue and fleeting dull pains (<1 min duration) in left wrist, both elbows, both shoulders and a sharp pain in the sternoclavicular joint. Felt normal within about 45 min. Exam next day normal. No treatment.
65	DCS	0	4	Dull, deep, right hip pain 3-4 min after surfacing from dive, felt as if penetrating through hip; not radiating in a dermatomal pattern, and no evidence of any neurologic involvement; immediately recompressed, and pain disappeared within 10 fsw. Full relief on TT6A.
74	DCS	60	105	Noted pain in left distal forearm 1 hr 45 min after surfacing. Exam showed tenderness to palpation over wrist and ulnar head anteriorly on left, pain aggravated on grasping or pulling, and mild decrease in pin prick sensation over medial aspect of hand. Remainder of exam normal Standard TT6 with normal sensation in 20 min and complete relief of all symptoms in 1 hr.
76	DCS	120	720	Normal exam 2 hrs post dive, although subject noted a "full" feeling. Awoke next day with intermittent sharp pain in right thigh above right knee. Found to have mildly decreased strength in right lower extremity, decreased right ankle reflex, decreased position sense in right big toe, crossed abductor response on leg, focal tenderness to touch on right medial thigh, and tenderness in a 6-8 cm area on a T12 distribution on the left posterior ribs. TT6 brought relief of all symptoms and signs except for right thigh tenderness < 20 min. The right thigh pain persisted several days and was felt to be due to mechanical injury.

94	Marginal	120	360	Two nearly identical episodes of dull right supraclavicular pain occurring ~ 5 and 6.5 hrs post surfacing; described pain as moderate, dull, not aggravated by movement, nontender, lasting ~ 5 min each; exam normal following day.
98	Marginal	60	120	Blotchy, pruritic rash on anterior trunk about 2 hrs after surfacing; faded over 5-6 hours; normal exam
105	Marginal	120	240	"skin bends" 4 hrs after surfacing; 6 cm round, raised, red lesion over right side of waist, slightly pruritic; no treatment; exam normal 2 hrs after surfacing.
116	Marginal	120	360	Mild left elbow ache lasting about 5 min evening following dive. normal exam
119	Marginal	5	20	Brief ache in left heel about 20 min after surfacing; dull ache in left knee lasting about 1 min, onset about 2 hrs post dive; normal exam
126	Marginal	5	20	Several transient pains, each lasting 1-2 min; moderate pain in right ankle 20 min post dive, tingling of right foot 10 min later, moderate pain of right knee 15 min later; exam normal. Also reported creptance in left temporomandibular joint post dive (TMJ symptoms probably mechanical from mask)
132	DCS	120	180	Right shoulder pain beginning 3 hrs after surfacing, gradual increase in intensity. Full resolution on standard TT5.
143	DCS	5	20	Mild pain superior & lateral to left eye ~ 20 min after surfacing, worse upon gaze to the right. Tender to palpation. Neuro exam, including visual acuity, visual fields, extraocular movement, corneal reflex, & blink reflex, was normal. No change in symptoms for 1 hr until recompression initiated. Symptoms resolved soon after treatment started with full resolution on standard TT6.
162	DCS	120	420	Reported 8 hrs after surfacing that both shoulders had dull, poorly localized ache for the previous hour, which then subsided. Normal exam; Dx: DCS not requiring treatment
173	DCS	120	360	Reported dull, deep ache in right shoulder the night after the dive. Pain gone next morning. Not reported until the following week. Dx: DCS not treated.
176	Marginal	60	120	4-5 episodes of brief (< 1 min) right shoulder pain; normal exam.
180	Marginal	60	120	Dull ache for about 5 min in right shoulder occurring over two hrs post dive, and dull pain for <1 min in right foot evening following dive; normal exam next day.
181	Marginal	5	60	Several episodes of 3-4 min aches in right hip, ankle, and scapular region in first hour post-dive. Normal neuro.
184	DCS	5	60	Fleeting 10-15 sec pain over left side of neck about 1 hr post dive followed within a few min by left shoulder pain; pain was described as deep-seated ache. Left upper extremity slightly weaker than right in wrist extension and elbow flexion. DTRs symmetric, sensation intact, remainder of neurologic exam normal. Recompressed to 60 fsw. Pain and weakness relieved < 20 min of treatment. Treated with TT6 extended once at 30 fsw and judged by DMO to have complete relief. Neuro consultant following day found slight weakness in left finger and wrist extensors; no improvement with repeat TT6. Neuro exam 1 week later (including EMC) normal.
186	Marginal	60	150	Dull ache in right knee about 2.5 hrs after surfacing, lasting 2-3 min; normal exam.
193	DCS	120	360	Reported pressure on mid-back from seat during the dive; no symptoms for 2.5 hrs after surfacing. After dinner that evening complained of mid-back pain and rash, left posterior flank pain and fatigue; exam showed erythema over T8 spinous process & over left anterior infracostal area, also hypoesthesia in left anterior infracostal area; Standard TT6 brought substantial relief within 1-2 mins. All symptoms resolved in 20-30 min except for pinpoint tenderness over spinous process of T8. This local tenderness resolved over next several days.

208	Marginal	60	120	Developed skin itch just before 2 hr doppler, accompanied by erythema on trunk. Subject heard recording; neuro exam normal except for generally increased muscle tone, including 3+ DTRs and 1-2 beat nonsustained clonus in both ankles. No nausea, dizziness or dyspnea. Blotchy rash on trunk gradually shifted and became bluish and raised, but never tender. Pulse 108, BP 164/100 but returned to normal within 1/2 hr and subject became less anxious.; 4 hrs post dive subject was normal except for mild itching. Skin bends & nonspecific findings suggest catecholamine release.
221	Marginal	60	120	Mild left shoulder ache about 2 hrs after surfacing, about 3 min duration, unaffected by movement; normal exam
223	Marginal	120	210	3 episodes of strong, throbbing pain the evening after surfacing, each lasting "only a minute or two"; left wrist twice and left medial arm near shoulder; exam normal.
226	Marginal	120	360	Fine until 3.5 hrs after surfacing, noted itching in right periumbilical region; pruritis progressed to a circumferential erythematous lesion which blanched on pressure; exam 6 hrs after surfacing found two well-demarcated, purple skin lesions, periumbilical and over right ribs 9-11 posteriorly. Mild tenderness to palpation in abdomen; neuro normal. Rash improved following morning, but abdominal tenderness to deep palpation had changed in location. No symptoms or other signs to explain abdominal pain. Patient recompressed to 60 fsw and abdominal tenderness improved within 1 hr. Treated on TT6 with one extension at 30 fsw with full resolution of abdominal tenderness. Rash also resolved with treatment.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	NMR8697	0.0	2	66.0	30.0	1.4			DRA4:[WEATHERSBY.DLE]8301
2	NMR8697	0.0	4	67.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
3	NMR8697	0.0	4	67.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
4	NMR8697	0.0	2	67.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
5	NMR8697	0.0	6	71.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
6	NMR8697	1.0	1	71.0	30.0	1.5	151.5	271.5	DRA4:[WEATHERSBY.DLE]8301
7	NMR8697	0.5	1	71.0	30.0	1.5	91.5	151.5	DRA4:[WEATHERSBY.DLE]8301
8	NMR8697	0.0	4	71.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
9	NMR8697	0.5	1	71.0	30.0	1.5	151.5	391.5	DRA4:[WEATHERSBY.DLE]8301
10	NMR8697	0.0	3	71.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
11	NMR8697	0.0	1	71.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
12	NMR8697	0.0	2	71.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
13	NMR8697	0.0	2	71.0	30.0	1.5			DRA4:[WEATHERSBY.DLE]8301
14	NMR8697	0.0	1	75.0	30.0	1.6			DRA4:[WEATHERSBY.DLE]8301
15	NMR8697	0.5	1	75.0	30.0	1.6	36.6	91.6	DRA4:[WEATHERSBY.DLE]8301
16	NMR8697	0.0	3	75.0	30.0	1.6			DRA4:[WEATHERSBY.DLE]8301
17	NMR8697	0.0	2	75.0	30.0	1.6			DRA4:[WEATHERSBY.DLE]8301
18	NMR8697	0.0	2	75.0	30.0	1.6			DRA4:[WEATHERSBY.DLE]8301
19	NMR8697	0.0	5	79.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301
20	NMR8697	0.0	1	79.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301
21	NMR8697	0.0	2	79.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301
22	NMR8697	0.0	2	79.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301
23	NMR8697	0.0	1	83.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301
24	NMR8697	0.0	2	83.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301
25	NMR8697	0.0	4	83.0	30.0	1.7			DRA4:[WEATHERSBY.DLE]8301

26	NMR8697	0.0	2	83.0	30.0	1.7	DRA4:[WEATHERSBY.DLE]8301
27	NMR8697	0.0	2	83.0	30.0	1.7	DRA4:[WEATHERSBY.DLE]8301
28	NMR8697	0.0	3	87.0	30.0	1.8	DRA4:[WEATHERSBY.DLE]8301
29	NMR8697	0.0	2	87.0	30.0	1.8	DRA4:[WEATHERSBY.DLE]8301
30	NMR8697	0.0	5	87.0	30.0	1.8	DRA4:[WEATHERSBY.DLE]8301
31	NMR8697	0.0	2	91.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
32	NMR8697	0.0	1	91.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
33	NMR8697	0.0	2	95.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
34	NMR8697	0.0	2	95.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
35	NMR8697	0.0	2	95.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
36	NMR8697	0.0	2	95.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
37	NMR8697	0.0	2	95.0	30.0	1.9	DRA4:[WEATHERSBY.DLE]8301
38	NMR8697	0.0	2	100.0	30.0	2.0	DRA4:[WEATHERSBY.DLE]8301
39	NMR8697	0.0	2	100.0	30.0	2.0	DRA4:[WEATHERSBY.DLE]8301
40	NMR8697	0.0	2	100.0	30.0	2.0	DRA4:[WEATHERSBY.DLE]8301
41	NMR8697	0.0	4	100.0	30.0	2.0	DRA4:[WEATHERSBY.DLE]8301
42	NMR8697	0.0	2	105.0	30.0	2.1	DRA4:[WEATHERSBY.DLE]8301
43	NMR8697	0.0	4	105.0	30.0	2.1	DRA4:[WEATHERSBY.DLE]8301
44	NMR8697	0.5	1	105.0	30.0	2.1	DRA4:[WEATHERSBY.DLE]8301
45	NMR8697	0.0	3	105.0	30.0	2.1	DRA4:[WEATHERSBY.DLE]8301
46	NMR8697	0.0	4	110.0	30.0	2.2	DRA4:[WEATHERSBY.DLE]8301
47	NMR8697	0.0	4	110.0	30.0	2.2	DRA4:[WEATHERSBY.DLE]8301
48	NMR8697	0.0	2	110.0	30.0	2.2	DRA4:[WEATHERSBY.DLE]8301
49	NMR8697	0.0	2	115.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301
50	NMR8697	0.0	2	115.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301
51	NMR8697	0.0	2	115.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301
52	NMR8697	0.0	4	115.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301
53	NMR8697	0.0	2	120.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301
54	NMR8697	0.0	2	120.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301
55	NMR8697	0.0	4	120.0	30.0	2.3	DRA4:[WEATHERSBY.DLE]8301



56	NMR8697	0.0	2	120.0	30.0	2.3			DRA4:[WEATHERSBY.DLE]8301
57	NMR8697	0.0	1	125.0	30.0	2.4			DRA4:[WEATHERSBY.DLE]8301
58	NMR8697	1.0	1	125.0	30.0	2.4	152.4	272.4	DRA4:[WEATHERSBY.DLE]8301
59	NMR8697	0.0	3	125.0	30.0	2.4			DRA4:[WEATHERSBY.DLE]8301
60	NMR8697	0.0	4	125.0	30.0	2.4			DRA4:[WEATHERSBY.DLE]8301
61	NMR8697	0.0	2	125.0	30.0	2.4			DRA4:[WEATHERSBY.DLE]8301
62	NMR8697	0.0	2	130.0	30.0	2.5			DRA4:[WEATHERSBY.DLE]8301
63	NMR8697	0.0	2	130.0	30.0	2.5			DRA4:[WEATHERSBY.DLE]8301
64	NMR8697	0.0	1	130.0	30.0	2.5			DRA4:[WEATHERSBY.DLE]8301
65	NMR8697	1.0	1	130.0	30.0	2.5	32.5	36.5	DRA4:[WEATHERSBY.DLE]8301
66	NMR8697	0.0	1	130.0	30.0	2.5			DRA4:[WEATHERSBY.DLE]8301
67	NMR8697	0.0	2	43.0	60.0	1.0			DRA4:[WEATHERSBY.DLE]8301
68	NMR8697	0.0	4	43.0	60.0	1.0			DRA4:[WEATHERSBY.DLE]8301
69	NMR8697	0.0	4	43.0	60.0	1.0			DRA4:[WEATHERSBY.DLE]8301
70	NMR8697	0.0	4	44.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
71	NMR8697	0.0	2	44.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
72	NMR8697	0.0	2	44.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
73	NMR8697	0.0	2	44.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
74	NMR8697	1.0	1	46.0	60.0	1.1	121.1	166.1	DRA4:[WEATHERSBY.DLE]8301
75	NMR8697	0.0	1	46.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
76	NMR8697	1.0	1	46.0	60.0	1.1	181.1	781.1	DRA4:[WEATHERSBY.DLE]8301
77	NMR8697	0.0	3	46.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
78	NMR8697	0.0	2	46.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
79	NMR8697	0.0	2	46.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
80	NMR8697	0.0	2	47.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
81	NMR8697	0.0	4	47.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
82	NMR8697	0.0	3	47.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
83	NMR8697	0.0	2	47.0	60.0	1.1			DRA4:[WEATHERSBY.DLE]8301
84	NMR8697	0.0	6	50.0	60.0	1.2			DRA4:[WEATHERSBY.DLE]8301
85	NMR8697	0.0	2	50.0	60.0	1.2			DRA4:[WEATHERSBY.DLE]8301

86	NMR8697	0.0	2	50.0	60.0	1.2	DRA4:[WEATHERSBY.DLE]8301
87	NMR8697	0.0	3	53.0	60.0	1.2	DRA4:[WEATHERSBY.DLE]8301
88	NMR8697	0.0	2	53.0	60.0	1.2	DRA4:[WEATHERSBY.DLE]8301
89	NMR8697	0.0	4	53.0	60.0	1.2	DRA4:[WEATHERSBY.DLE]8301
90	NMR8697	0.0	1	53.0	60.0	1.2	DRA4:[WEATHERSBY.DLE]8301
91	NMR8697	0.0	2	56.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
92	NMR8697	0.0	2	56.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
93	NMR8697	0.0	2	56.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
94	NMR8697	0.5	1	56.0	60.0	181.3 421.3	DRA4:[WEATHERSBY.DLE]8301
95	NMR8697	0.0	1	56.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
96	NMR8697	0.0	2	56.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
97	NMR8697	0.0	1	59.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
98	NMR8697	0.5	1	59.0	60.0	121.3 181.3	DRA4:[WEATHERSBY.DLE]8301
99	NMR8697	0.0	2	59.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
100	NMR8697	0.0	1	59.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
101	NMR8697	0.0	1	59.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
102	NMR8697	0.0	2	59.0	60.0	1.3	DRA4:[WEATHERSBY.DLE]8301
103	NMR8697	0.0	2	72.0	60.0	1.5	DRA4:[WEATHERSBY.DLE]8301
104	NMR8697	0.0	2	72.0	60.0	1.5	DRA4:[WEATHERSBY.DLE]8301
105	NMR8697	0.5	1	72.0	60.0	181.5 301.5	DRA4:[WEATHERSBY.DLE]8301
106	NMR8697	0.0	1	72.0	60.0	1.5	DRA4:[WEATHERSBY.DLE]8301
107	NMR8697	0.0	2	72.0	60.0	1.5	DRA4:[WEATHERSBY.DLE]8301
108	NMR8697	0.0	2	72.0	60.0	1.5	DRA4:[WEATHERSBY.DLE]8301
109	NMR8697	0.0	2	72.0	60.0	1.5	DRA4:[WEATHERSBY.DLE]8301
110	NMR8697	0.0	2	76.0	60.0	1.6	DRA4:[WEATHERSBY.DLE]8301
111	NMR8697	0.0	2	76.0	60.0	1.6	DRA4:[WEATHERSBY.DLE]8301
112	NMR8697	0.0	2	76.0	60.0	1.6	DRA4:[WEATHERSBY.DLE]8301
113	NMR8697	0.0	2	76.0	60.0	1.6	DRA4:[WEATHERSBY.DLE]8301
114	NMR8697	0.0	2	76.0	60.0	1.6	DRA4:[WEATHERSBY.DLE]8301
115	NMR8697	0.0	2	80.0	60.0	1.7	DRA4:[WEATHERSBY.DLE]8301

116	NMR8697	0.5	1	80.0	60.0	1.7	181.7	421.7	DRA4:[WEATHERSBY.DLE]8301
117	NMR8697	0.0	1	80.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
118	NMR8697	0.0	1	80.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
119	NMR8697	0.5	1	80.0	60.0	1.7	66.7	81.7	DRA4:[WEATHERSBY.DLE]8301
120	NMR8697	0.0	2	80.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
121	NMR8697	0.0	2	80.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
122	NMR8697	0.0	2	84.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
123	NMR8697	0.0	4	84.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
124	NMR8697	0.0	2	84.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
125	NMR8697	0.0	2	84.0	60.0	1.7			DRA4:[WEATHERSBY.DLE]8301
126	NMR8697	0.5	1	88.0	60.0	1.8	66.8	81.8	DRA4:[WEATHERSBY.DLE]8301
127	NMR8697	0.0	1	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
128	NMR8697	0.0	2	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
129	NMR8697	0.0	2	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
130	NMR8697	0.0	2	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
131	NMR8697	0.0	1	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
132	NMR8697	1.0	1	88.0	60.0	1.8	181.8	241.8	DRA4:[WEATHERSBY.DLE]8301
133	NMR8697	0.0	2	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
134	NMR8697	0.0	3	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
135	NMR8697	0.0	2	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
136	NMR8697	0.0	2	88.0	60.0	1.8			DRA4:[WEATHERSBY.DLE]8301
137	NMR8697	0.0	1	92.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
138	NMR8697	0.0	2	92.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
139	NMR8697	0.0	2	92.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
140	NMR8697	0.0	2	92.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
141	NMR8697	0.0	2	92.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
142	NMR8697	0.0	1	96.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
143	NMR8697	1.0	1	96.0	60.0	1.9	66.9	81.9	DRA4:[WEATHERSBY.DLE]8301
144	NMR8697	0.0	2	96.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301
145	NMR8697	0.0	1	96.0	60.0	1.9			DRA4:[WEATHERSBY.DLE]8301

146	NMR8697	0.0	2	96.0	60.0	1.9	DRA4:[WEATHERSBY.DLE]8301
147	NMR8697	0.0	2	96.0	60.0	1.9	DRA4:[WEATHERSBY.DLE]8301
148	NMR8697	0.0	1	96.0	60.0	1.9	DRA4:[WEATHERSBY.DLE]8301
149	NMR8697	0.0	2	96.0	60.0	1.9	DRA4:[WEATHERSBY.DLE]8301
150	NMR8697	0.0	2	25.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
151	NMR8697	0.0	4	25.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
152	NMR8697	0.0	2	25.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
153	NMR8697	0.0	2	25.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
154	NMR8697	0.0	2	27.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
155	NMR8697	0.0	4	27.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
156	NMR8697	0.0	2	27.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
157	NMR8697	0.0	2	27.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
158	NMR8697	0.0	2	29.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
159	NMR8697	0.0	2	29.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
160	NMR8697	0.0	2	29.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
161	NMR8697	0.0	1	29.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
162	NMR8697	1.0	1	29.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
163	NMR8697	0.0	2	29.0	240.2	0.6	DRA4:[WEATHERSBY.DLE]8301
164	NMR8697	0.0	2	31.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
165	NMR8697	0.0	2	31.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
166	NMR8697	0.0	2	31.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
167	NMR8697	0.0	2	31.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
168	NMR8697	0.0	2	31.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
169	NMR8697	0.0	5	33.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
170	NMR8697	0.0	1	33.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
171	NMR8697	0.0	1	33.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
172	NMR8697	0.0	1	33.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
173	NMR8697	1.0	1	33.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
174	NMR8697	0.0	2	33.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301
175	NMR8697	0.0	4	34.0	240.2	0.7	DRA4:[WEATHERSBY.DLE]8301

176	NMR8697	0.5	1	34.0	240.2	0.7	300.9	360.9	DRA4:[WEATHERSBY.DLE]8301
177	NMR8697	0.0	1	34.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
178	NMR8697	0.0	2	34.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
179	NMR8697	0.0	1	34.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
180	NMR8697	0.5	1	34.0	240.2	0.7	300.9	360.9	DRA4:[WEATHERSBY.DLE]8301
181	NMR8697	0.5	1	35.0	240.2	0.7	245.9	300.9	DRA4:[WEATHERSBY.DLE]8301
182	NMR8697	0.0	1	35.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
183	NMR8697	0.0	4	35.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
184	NMR8697	1.0	1	35.0	240.2	0.7	245.9	300.9	DRA4:[WEATHERSBY.DLE]8301
185	NMR8697	0.0	2	36.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
186	NMR8697	0.5	1	36.0	240.2	0.7	300.9	390.9	DRA4:[WEATHERSBY.DLE]8301
187	NMR8697	0.0	1	36.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
188	NMR8697	0.0	3	36.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
189	NMR8697	0.0	2	36.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
190	NMR8697	0.0	2	36.0	240.2	0.7			DRA4:[WEATHERSBY.DLE]8301
191	NMR8697	0.0	2	38.0	240.2	0.8			DRA4:[WEATHERSBY.DLE]8301
192	NMR8697	0.0	2	50.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
193	NMR8697	1.0	1	50.0	240.0	1.2	361.2	601.2	DRA4:[WEATHERSBY.DLE]8301
194	NMR8697	0.0	5	50.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
195	NMR8697	0.0	4	50.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
196	NMR8697	0.0	2	50.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
197	NMR8697	0.0	4	50.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
198	NMR8697	0.0	2	50.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
199	NMR8697	0.0	2	54.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
200	NMR8697	0.0	2	54.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
201	NMR8697	0.0	2	54.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
202	NMR8697	0.0	2	54.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
203	NMR8697	0.0	2	54.0	240.0	1.2			DRA4:[WEATHERSBY.DLE]8301
204	NMR8697	0.0	2	58.0	240.0	1.3			DRA4:[WEATHERSBY.DLE]8301
205	NMR8697	0.0	2	58.0	240.0	1.3			DRA4:[WEATHERSBY.DLE]8301

206	NMR8697	0.0	4	58.0	240.0	1.3	DRA4:[WEATHERSBY.DLE]8301
207	NMR8697	0.0	1	58.0	240.0	1.3	DRA4:[WEATHERSBY.DLE]8301
208	NMR8697	0.5	1	58.0	240.0	1.3	DRA4:[WEATHERSBY.DLE]8301
209	NMR8697	0.0	2	62.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
210	NMR8697	0.0	4	62.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
211	NMR8697	0.0	2	62.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
212	NMR8697	0.0	2	62.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
213	NMR8697	0.0	4	66.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
214	NMR8697	0.0	2	66.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
215	NMR8697	0.0	2	66.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
216	NMR8697	0.0	2	66.0	240.0	1.4	DRA4:[WEATHERSBY.DLE]8301
217	NMR8697	0.0	2	70.0	240.0	1.5	DRA4:[WEATHERSBY.DLE]8301
218	NMR8697	0.0	2	70.0	240.0	1.5	DRA4:[WEATHERSBY.DLE]8301
219	NMR8697	0.0	2	70.0	240.0	1.5	DRA4:[WEATHERSBY.DLE]8301
220	NMR8697	0.0	2	70.0	240.0	1.5	DRA4:[WEATHERSBY.DLE]8301
221	NMR8697	0.5	1	70.0	240.0	1.5	DRA4:[WEATHERSBY.DLE]8301
222	NMR8697	0.0	1	70.0	240.0	1.5	DRA4:[WEATHERSBY.DLE]8301
223	NMR8697	0.5	1	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301
224	NMR8697	0.0	1	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301
225	NMR8697	0.0	1	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301
226	NMR8697	0.5	1	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301
227	NMR8697	0.0	3	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301
228	NMR8697	0.0	2	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301
229	NMR8697	0.0	2	74.0	240.0	1.6	DRA4:[WEATHERSBY.DLE]8301

## **SECTION II: SINGLE NON-AIR DIVES**

### **B. EDU1180S**

- 120 dives: 10 DCS, 0 Marginal
- All dives were wet; water temperature was maintained between 73-80°F.
- Dives were conducted during the period 1977 - 1978
- Exercise performed at depth on bicycle ergometers; 2 divers simultaneously for periods of 10-20 minutes (25-50 watts), then rotated with 2 other divers (usually 10 divers per trial). This rotation continued throughout the dive.
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Manifestation descriptions were taken from reference (1).

1. Thalmann ED, Buckingham IP, Spaur WH. Testing of Decompression Algorithms for use in the U.S. Navy Underwater Decompression Computer. Phase I. NEDU Tech Report 11-80, August 1980.

## SECTION II: SINGLE NON-AIR DIVES

### B. EDU1180S 120 dives: 10 DCS, 0 Marginal

Profile #	T1 (mins)	T2 (mins)	Signs & Symptoms
1	30	90	Onset 1.5 hrs post dive; pain left shoulder, elbow and wrist. Treatment Table 5
2	30	105	Onset 1 hr 45 min post dive; pain left shoulder and scapula. Treatment Table 5
4	120	420	Onset 7 hours post dive; pain right shoulder and hip. Treatment Table 5
7	10	45	Onset 45 min post dive; pain right knee. Treatment Table 5
8	120	480	Onset 8 hours post dive; pain right forearm. Treatment Table 6
9	-128.6	20	Onset 20 min post dive; Shortness of breath, postural hypotension, shivering, pain both shoulders, severe skin mottling. Diver Said shortness of breath began at 60' stop during decompression in test dive. Felt very cold. Started taking Prosthaphlin 24 hrs before dive for paronychia. Treated at 60 fsw for 4 hrs while receiving 3000 cc fluids. Decompressed on saturation schedule. Breathed air during decompression. Only symptom after surfacing was malaise which disappeared in one week.
11	30	60	Onset 1 hr post dive; pain left wrist. Complained of being very cold during the dive. Treatment Table 5
12	120	420	Onset 7 hrs post dive; pain right shoulder. Complained of being very cold during the dive. Treatment Table 5;
13	30	90	Onset 1.5 hrs post dive; pain left shoulder. Complained of being very cold during the dive. Treatment Table 5
15	30	90	Onset 1.5 hrs post dive; mild paresthesia left leg. Diver very cold and tired. Treatment Table 6.



Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU1180S	1.0	1	150.0	73.2	143.8	252.0	312.0	DIV361 1 REPETS=1
2	EDU1180S	1.0	1	150.0	73.2	143.8	252.0	327.0	DIV361 2 REPETS=1
3	EDU1180S	0.0	8	150.0	73.2	143.8			DIV361 3 REPETS=1
4	EDU1180S	1.0	1	149.0	79.3	176.7	381.0	681.0	DIV461 11 REPETS=1
5	EDU1180S	0.0	9	149.0	79.3	176.7			DIV461 12 REPETS=1
6	EDU1180S	0.0	10	150.0	73.2	140.8			DIV561 21 REPETS=1
7	EDU1180S	1.0	1	150.0	72.3	142.7	230.0	265.0	DIV562 31 REPETS=1
8	EDU1180S	1.0	1	150.0	72.3	142.7	340.0	700.0	DIV562 32 REPETS=1
9	EDU1180S	1.0	1	150.0	72.3	142.7	91.4	240.0	DIV562 33 REPETS=1
10	EDU1180S	0.0	7	150.0	72.3	142.7			DIV562 34 REPETS=1
11	EDU1180S	1.0	1	150.0	60.0	108.0	203.0	233.0	DIV571 41 REPETS=1
12	EDU1180S	1.0	1	150.0	60.0	108.0	293.0	593.0	DIV571 42 REPETS=1
13	EDU1180S	1.0	1	150.0	60.0	108.0	203.0	263.0	DIV571 43 REPETS=1
14	EDU1180S	0.0	7	150.0	60.0	108.0			DIV571 44 REPETS=1
15	EDU1180S	1.0	1	100.0	67.1	54.9	157.0	217.0	DIV581 51 REPETS=1
16	EDU1180S	0.0	9	100.0	67.1	54.9			DIV581 52 REPETS=1
17	EDU1180S	0.0	10	150.0	42.8	74.2			DIV591 61 REPETS=1
18	EDU1180S	0.0	10	150.0	37.7	72.3			DIV592 71 REPETS=1
19	EDU1180S	0.0	10	100.0	54.9	46.1			DIV5A1 81 REPETS=1
20	EDU1180S	0.0	10	100.0	67.8	46.2			DIV5A2 91 REPETS=1
21	EDU1180S	0.0	10	75.0	124.9	55.1			DIV5C1 101 REPETS=1
22	EDU1180S	0.0	10	75.0	126.2	54.8			DIV5C2 111 REPETS=1

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## SECTION II: SINGLE NON-AIR DIVES

### C. EDU885M

- 81 dives: 4 DCS, 0 Marginal
- All dives were wet; water temperature ( $\pm 2^{\circ}\text{F}$ ) set by dive time:
  - $\geq 250$  min  $65^{\circ}\text{F}$
  - 249-190 min  $60^{\circ}\text{F}$
  - 179-180 min  $55^{\circ}\text{F}$
  - $\leq 79$  min  $50^{\circ}\text{F}$
- Dives were conducted during November 1984
- Exercise: intermittently at depth on a bicycle ergometer (75 watts) at 55-60 rpm
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations were provided in reference 1.

1. Thalmann, ED. Air-N<sub>2</sub>O<sub>2</sub> Decompression Computer Algorithm Development. Navy Experimental Diving Unit Report No. 8-85. August 1986.

## SECTION II: SINGLE NON-AIR DIVES

### C. EDU885M 81 dives: 4 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	S/S & Comments
6	120.4	180.5	Left knee pain onset 3 hrs post dive. Complete relief upon arrival at 60 FSW. TT5. 18 hrs after completing treatment had sudden onset left shoulder pain. Compressed to 60 FSW with no change after 20 min. Because of pulmonary O <sub>2</sub> toxicity brought to surface at 20 FSW/min. 3 days later, during a 150/40 0.7 ATA PO <sub>2</sub> dive, pain completely disappeared at 150 FSW and never returned.
7	30.5	150.5	Left elbow pain, onset 2.5 hrs post dive. Complete relief after 10 min at 60 FSW. TT5.
10	120.2	840.2	Left hand pain, 1st and 2nd metacarpal onset 14 hrs post dive. Complete relief after 10 min at 60 FSW. TT5.
11	120.2	1080.2	Right knee and elbow pain onset 18 hrs post dive. Elbow pain began 20 min after knee pain. Complete relief on arrival at 60 FSW. TT5.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU885M	0.0	9	100.0	66.4	47.8			AN1043.O 1 REPETS= 1
2	EDU885M	0.0	10	100.0	62.9	48.1			AN1044.O 10 REPETS= 1
3	EDU885M	0.0	9	150.0	35.6	35.1			AN1046.O 20 REPETS= 1
4	EDU885M	0.0	10	150.0	33.3	34.8			AN1047.O 29 REPETS= 1
5	EDU885M	0.0	8	100.0	65.3	48.2			AN2001.O 39 REPETS= 1
6	EDU885M	1.0	1	150.0	64.8	221.7	407.0	467.0	AN2003.O 47 REPETS= 1
7	EDU885M	1.0	1	150.0	64.8	221.7	317.0	437.0	AN2003.O 48 REPETS= 1
8	EDU885M	0.0	7	150.0	64.8	86.8			AN2006.O 56 REPETS= 2
10	EDU885M	1.0	1	150.0	44.6	86.2	251.0	971.0	AN2007.O 64 REPETS= 1
11	EDU885M	1.0	1	150.0	44.6	86.2	251.0	1211.0	AN2007.O 65 REPETS= 1
12	EDU885M	0.0	7	150.0	44.6	86.2			AN2007.O 66 REPETS= 1
13	EDU885M	0.0	9	150.0	43.7	84.6			AN2008.O 73 REPETS= 1



### **SECTION III: REPETITIVE & MULTILEVEL AIR DIVES**

#### **A. PAMLA**

- 236 dives: 13 DCS, 12 Marginal
- All dives were wet; water temperatures as follows ( $\pm 2^{\circ}\text{F}$ ):

$\leq 90$ min	55°F
91-200 min	60°F
201-300 min	65°F
301-480 min	70°F
> 480 min	75°F
- Dives were conducted during the period Feb 91 - Jun 91 (NMRI) and Jul 91 - Jan 92 (NEDU)
- Exercise - at depth on a bicycle ergometer; 10 minutes exercise, 10 minutes rest throughout the bottom time
- Comments and manifestation descriptions were taken from ref (1) below and in some cases of the dives performed at NMRI, from the archived medical folders.

1. Statistically Based Decompression Tables XI: Manned validation of the LE probabilistic decompression model for air and nitrogen-oxygen diving. ED Thalmann, PC Kelleher, SS Survanshi, EC Parker, PK Weathersby. Joint Technical Report, NEDU #1-99 and NMRC #99-01, Naval Medical Research Center, Bethesda, MD. January 1999.

### SECTION III: REPETITIVE & MULTILEVEL AIR DIVES

#### A. PAMLA 236 dives: 13 DCS, 12 Marginal

Profile #	Outcome	T1 (mins)	T2 (mins)	Signs & Symptoms
2	DCS	-69.9	20	Type I. Onset time 20 minutes. Bilateral upper arm pain initially fluctuating symptoms and resolved spontaneously only to recur several hours later. Treatment began 9 hours after surfacing. Complete relief just after 10 minutes at 60 fsw. TT6 completed.
3	Marginal	120	450	Mild intermittent pain right foot, 2nd digit; onset 7 hrs 30 min post dive occurring on and off for 2 hours.
4	Marginal	120	240	Bilateral elbow pain X 2 min; onset 4 hrs post dive; bilateral knee and ankle pain X 5 min, onset 7 hrs post dive; bilateral ankle pain X 1 min, onset 9 hrs post dive.
5	Marginal	120	540	Mild intermittent right thigh pain, onset 9 hrs post dive occurring on and off for 1 hour.
7	Marginal	-95.6	-69.5	Left knee pain for 30 seconds at the 20 fsw decompression stop.
9	DCS	120	180	Onset time 3 hrs. Type I - right shoulder pain; Type II - right triceps weakness. Treatment began 6 hours after surfacing. Complete relief after 2nd O <sub>2</sub> period at 60 fsw except mild residual soreness; TT6 completed. Remained asymptomatic 6 hrs post treatment but 32 hours later noted to have 4/5 right triceps weakness. Complete relief after 2nd O <sub>2</sub> period on repeat TT6.
11	DCS	120	150	Onset time 2 hr 30 min. Type I - left shoulder & arm pain; left subscapular rash. Type II - left upper arm sensory deficit. Initial symptoms were left shoulder and left arm pain followed by a 6 cm purpuric rash below left scapula; then left upper arm weakness/sensory deficit. Treatment began 3 h and 3 min after surfacing. Complete relief after 3rd O <sub>2</sub> period at 60 fsw. TT6 completed. 8 hrs post treatment noted recurrence mild left upper arm and shoulder pain; mild left triceps weakness noted on exam. Complete relief after 2nd O <sub>2</sub> period on repeat TT6.
12	DCS	120	260	Onset time 4 hr 20 min. Type I - left shoulder & arm pain. Type II - left triceps and deltoid weakness and left upper arm sensory deficit. Progressive left shoulder and upper arm pain associated with left triceps and deltoid weakness; left arm decreased pin prick and soft touch sensation. Treatment began 7 h 50 min after surfacing. Symptoms resolved 60 min into TT6; 2 extensions @ 60 fsw and 30 fsw completed.
16	DCS	120	330	Onset time 5 hrs 30 min. Type I - right shoulder pain. Treatment began 8 h after surfacing. Complete relief 5 min into 3rd O <sub>2</sub> period at 60 fsw; completed TT6 extended once at 60 fsw and 30 fsw.
17	DCS	120	1800	Onset time 30 hrs. Type II - sensory deficit left posterior leg; weakness left leg flexors and extensors; onset intermittent left buttocks paresthesias 30 hrs post dive; progressed to constant paresthesias radiating down left leg after 2 days. On 3rd days post dive noted mild left leg weakness. Diver did not report symptoms until 7 days post dive. Neuro exam revealed decreased pin prick posterior left leg and 4/5 weakness left leg flexors and extensors. Treatment initiated 164 hrs post dive. Complete relief after 4th O <sub>2</sub> period at 60 fsw; TT6 with 2 extensions @ 60 fsw and 30 fsw completed.
18	Marginal	120	420	Onset 7 hrs; right shoulder pain lasting approx. 15 min
20	Marginal	-49.7	-0.20	Left shoulder pain for approx. 15 seconds at the 10 fsw decompression stop.
20	Marginal	-49.7	-0.20	Left elbow pain lasting 1 minute at the 10 fsw decompression stop.
20	Marginal	-49.7	-0.20	Left shoulder pain for 5 min at 10 fsw decompression stop.

23	DCS	30	70	Onset time 1 hr 10 min. Type I - left shoulder pain. Treatment began 1 h 30 min post dive. Complete relief 7 min into first O <sub>2</sub> period at 60 fsw. Completed TT6.
24	Marginal	15	70	Two episodes of right shoulder pain lasting 15 seconds; onset 1 hr 10 min and 1 hr 20 min post dive.
25	Marginal	120	420	Left knee pain, 7 hrs post dive; lasted approx. 2 minutes
27	DCS	120	130	Onset time 2 hrs 10 min. Type I - right elbow and right shoulder pain. Treatment began 4 h post dive. Complete relief 5 min into 2nd O <sub>2</sub> period @ 60 fsw. Completed TT6.
28	Marginal	120	240	Left wrist and elbow pain lasting 2 min; onset 4 hrs post dive
30	DCS	20	60	Onset time 1 hr. Type I - left shoulder pain. Treatment began 1 h 20 min post dive. Complete relief of symptoms on descent to 60 fsw; TT6 completed.
31	Marginal	120	540	Intermittent bilateral elbow and shoulder discomfort occurring several times approximately 9 hrs post dive; each episode lasted <1 minute.
36	DCS	120	240	Onset time 4 hrs. Type I - left shoulder pain. Treatment began 5 h post dive. Significant improvement after 5 O <sub>2</sub> periods @ 60 fsw. Complete relief at end of 1st O <sub>2</sub> period at 30 fsw. TT6 with 2 extensions @ 60 fsw and 30 fsw completed. Suffered DCS in left shoulder 20 days earlier. Uneventful dive on same profile 11 days prior to this episode.
42	DCS	120	180	Onset time 3 hrs. Type I - right shoulder pain. Treatment began 5 h post dive. Significant relief after 3 O <sub>2</sub> periods at 60 fsw. TT6 with one extension @ 60 fsw and 30 fsw completed. Minimal residual discomfort resolved within 1 week. Suffered Type II DCS 45 days prior. Uneventful dive on same profile 6 days prior to this episode.
44	DCS	120	960	Onset time 16 hrs. Type I - right elbow pain; initial 2 min episode 2 hrs post surfacing which resolved. Recurred the next morning. Treatment began 18 h 30 min post dive. Complete relief after 2 O <sub>2</sub> periods @ 60 fsw. TT6 completed. Suffered DCS 53 days prior; uneventful dive on same profile 8 days prior to this episode.
47	DCS	120	135	Onset time 2 hrs 15 min. Type I - right elbow and right knee pain. Treatment began 4 h post dive. Complete relief 2 min into 2nd O <sub>2</sub> period @ 60 fsw; TT6 completed. Suffered DCS 21 days prior; uneventful dive on same profile 6 days prior to this episode.



Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	PAMLA	0.0	6	81.5	240.1	97.7			PAA1B01
2	PAMLA	1.0	1	81.5	240.1	97.7	269.4	359.3	PAA1B01
3	PAMLA	0.5	1	81.5	240.1	97.7	459.3	789.3	PAA1B01
4	PAMLA	0.5	1	81.5	240.1	97.7	459.3	579.3	PAA1B01
5	PAMLA	0.5	1	81.5	240.1	97.7	459.3	879.3	PAA1B01
6	PAMLA	0.0	9	81.5	240.4	95.6			PAA1B02
7	PAMLA	0.5	1	81.5	240.4	95.6	240.4	266.5	PAA1B02
8	PAMLA	0.0	9	81.5	240.1	97.4			PAA1B03
9	PAMLA	1.0	1	81.5	240.1	97.4	462.3	522.3	PAA1B03
10	PAMLA	0.0	6	81.5	240.1	97.8			PAA1B04
11	PAMLA	1.0	1	81.5	240.1	97.8	460.8	490.8	PAA1B04
12	PAMLA	1.0	1	81.5	240.1	97.8	460.8	600.8	PAA1B04
13	PAMLA	0.0	10	61.5	240.3	50.4			PAA1C101
14	PAMLA	0.0	10	61.5	240.3	49.9			PAA1C102
15	PAMLA	0.0	7	61.5	239.8	50.7			PAA1C103
16	PAMLA	1.0	1	61.5	239.8	50.7	411.4	621.4	PAA1C103
17	PAMLA	1.0	1	61.5	239.8	50.7	411.4	2091.4	PAA1C103
18	PAMLA	0.5	1	61.5	239.8	50.7	411.4	711.4	PAA1C103
19	PAMLA	0.0	7	61.5	240.4	49.7			PAA1C104
20	PAMLA	0.5	3	61.5	240.4	49.7	240.4	289.9	PAA1C104
21	PAMLA	0.0	9	61.5	240.1	49.9			PAA1C105
22	PAMLA	0.0	7	61.5	300.1	58.3			PAA1C201
23	PAMLA	1.0	1	61.5	300.1	58.3	389.3	429.3	PAA1C201
24	PAMLA	0.5	1	61.5	300.1	58.3	374.3	429.3	PAA1C201
25	PAMLA	0.5	1	61.5	300.1	58.3	479.3	779.3	PAA1C201
26	PAMLA	0.0	8	61.5	300.0	57.8			PAA1C202
27	PAMLA	1.0	1	61.5	300.0	57.8	481.5	491.5	PAA1C202
28	PAMLA	0.5	1	61.5	300.0	57.8	481.5	601.5	PAA1C202
29	PAMLA	0.0	8	61.5	300.4	57.8			PAA1C203
30	PAMLA	1.0	1	61.5	300.4	57.8	380.7	420.7	PAA1C203

31	PAMLA	0.5	1	61.5	300.4	57.8	480.7	900.7	PAA1C203
32	PAMLA	0.0	7	61.5	300.1	57.6			PAA1C301
33	PAMLA	0.0	1	60.0	61.5	132.5			PAA1C301AB
34	PAMLA	0.0	10	61.5	302.3	58.1			PAA1C302
35	PAMLA	0.0	9	61.5	300.0	58.1			PAA1C303
36	PAMLA	1.0	1	61.5	300.0	58.1	479.2	599.2	PAA1C303
37	PAMLA	0.0	9	61.5	300.1	58.2			PAA1C304
38	PAMLA	0.0	5	61.5	300.0	58.3			PAA1C305
39	PAMLA	0.0	10	81.5	240.2	202.6			PAA1E01
40	PAMLA	0.0	8	81.5	240.3	202.6			PAA1E02
41	PAMLA	0.0	1	80.0	70.3	69.7			PAA1E02AB
42	PAMLA	1.0	1	81.5	240.3	202.6	573.0	633.0	PAA1E02
43	PAMLA	0.0	9	81.5	240.0	207.4			PAA1E03
44	PAMLA	1.0	1	81.5	240.0	207.4	569.5	1409.5	PAA1E03
45	PAMLA	0.0	9	81.5	240.0	202.4			PAA1E04
46	PAMLA	0.0	8	81.5	240.1	202.7			PAA1E05
47	PAMLA	1.0	1	81.5	240.1	202.7	564.1	579.1	PAA1E05
48	PAMLA	0.0	10	51.5	451.4	26.6			PAA11A01
49	PAMLA	0.0	9	51.5	451.6	31.6			PAA11A02
50	PAMLA	0.0	10	51.5	451.0	31.8			PAA11A03

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### **SECTION III: REPETITIVE & MULTILEVEL AIR DIVES**

#### **B. EDU885AR**

- 182 dives: 11 DCS, 0 Marginal
- All dives were wet; water temperature ( $\pm 2^{\circ}\text{F}$ ) set by dive time:
  - $\geq 250$  min  $65^{\circ}\text{F}$
  - 249-190 min  $60^{\circ}\text{F}$
  - 179-180 min  $55^{\circ}\text{F}$
  - $\leq 79$  min  $50^{\circ}\text{F}$
- Dives were conducted during the period August - December 1984
- Exercise: intermittently at depth on a bicycle ergometer (75 watts) at 55-60 rpm
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations were provided in reference 1.

1. Thalmann, ED. Air-N<sub>2</sub>O<sub>2</sub> Decompression Computer Algorithm Development. Navy Experimental Diving Unit Report No. 8-85. August 1986.

### SECTION III: REPETITIVE & MULTILEVEL AIR DIVES

**B. EDU885AR 182 Dives: 11 DCS, 0 Marginal**

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
2	-170.8	-137.8	Bilateral elbow pain, 10' stop 2nd dive. Symptoms began 2 hrs before surfacing, very mild initially. Elbow pain gone at 50 FSW on compression, shoulder pain gone after 6 min at 60 FSW. TT6.
3	-266.9	10	Right knee pain, surface interval. Noted onset putting on wetsuit for second dive. Pain gone as soon as water entered. Pain recurred a few min after surfacing from second dive. Complete relief at 36 FSW on compression. TT5.
4	120.1	420.1	Left shoulder pain 7 hrs post dive; left arm paresthesia 7.5 hrs post dive. Reported for treatment 8.5 hrs post dive. Complete relief upon arrival at 60 FSW on compression. On arrival at 30 FSW on Treatment Table 6 had paresthesia over left hip and rash over both hips. Recompressed to 60 FSW with 70% relief. Had 4 more O <sub>2</sub> periods at 60 FSW with very mild hip ache remaining. Complete relief after 2nd O <sub>2</sub> period at 30 FSW. Completed Treatment Table 6.
6	-0.3	5	Left shoulder pain 5 min post dive. Complete relief upon arrival at 60 FSW. Treatment Table 5.
7	120	1259.8	Left knee and elbow pain, very mild, 21 hrs post dive. Complete relief after 8 min at 60 FSW. Treatment Table 5.
10	120	210.2	Left shoulder and tricep. 3.5 hrs post dive. On compression, 75% relief. Complete relief after 3rd O <sub>2</sub> period. Treatment Table 6.
15	-2.2	10	Right shoulder pain 10 min post dive. Complete relief upon arrival at 60 FSW. Treatment Table 5.
18	-2.1	13	Right elbow and shoulder pain, 13 min post dive. Complete relief at 26 FSW during compression. Treatment Table 5.
20	-2.7	119.9	Right shoulder pain, 1 min post dive. Pain very slight post-dive. Increased in intensity overnight. Complete relief at 14 FSW during compression. Initially given TT5. Pain recurred at 6 FSW. recompressed to 30 FSW with 95% relief. Recompressed further to 60 FSW without change. Started TT6. No symptoms on surfacing.
21	119.9	239.9	Left shoulder ache, 4 hrs post dive. Pain initially disappeared 1.5 hrs after onset. Recurred 6 hrs later. Complete relief at 14 FSW on recompression. Started on Treatment Table 5. Pain recurred at 6 FSW. Complete relief after 9 min at 60 FSW. Complete Treatment Table 6.
25	30.2	90.2	Left shoulder pain and skin rash 90 min post dive. Complete relief on arrival at 60 FSW. Treatment Table 5

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU885AR	0.0	7	150.0	44.0	97.9			AN2009.OUT 1 REPETS=2
2	EDU885AR	1.0	1	100.0	62.1	59.8	301.1	334.1	AN2010.OUT 8 REPETS=2
3	EDU885AR	1.0	1	100.0	62.1	59.8	205.0	481.9	AN2010.OUT 9 REPETS=3
4	EDU885AR	1.0	1	100.0	62.1	59.8	592.0	892.0	AN2010.OUT 10 REPETS=3
5	EDU885AR	0.0	6	100.0	62.1	59.8			AN2010.OUT 11 REPETS=3
6	EDU885AR	1.0	1	150.0	43.9	97.1	458.9	464.2	AN2011.OUT 17 REPETS=2
7	EDU885AR	1.0	1	150.0	43.9	97.1	579.2	1719.0	AN2011.OUT 18 REPETS=2
8	EDU885AR	0.0	7	150.0	43.9	97.1			AN2011.OUT 19 REPETS=2
9	EDU885AR	0.0	7	100.0	65.9	69.8			AN2012.OUT 26 REPETS=3
10	EDU885AR	1.0	1	100.0	33.7	3.7	243.8	334.0	AN2017.OUT 33 REPETS=2
11	EDU885AR	0.0	8	100.0	33.7	3.7			AN2017.OUT 34 REPETS=2
12	EDU885AR	0.0	7	100.0	33.2	4.0			AN2019.OUT 42 REPETS=2
13	EDU885AR	0.0	10	100.0	30.3	3.7			AN2021.OUT 49 REPETS=2
14	EDU885AR	0.0	6	100.0	29.7	3.3			AN2022.OUT 59 REPETS=2
15	EDU885AR	1.0	1	80.0	43.2	2.7	280.7	292.9	AN3001.OUT 65 REPETS=2
16	EDU885AR	0.0	9	80.0	43.2	2.7			AN3001.OUT 66 REPETS=2
17	EDU885AR	0.0	10	80.0	43.4	2.1			AN3002.OUT 75 REPETS=2
18	EDU885AR	1.0	1	80.0	42.3	2.9	173.3	188.4	AN3003.OUT 85 REPETS=2
19	EDU885AR	0.0	9	80.0	42.3	2.9			AN3003.OUT 86 REPETS=2
20	EDU885AR	1.0	1	100.0	28.9	2.9	195.4	318.0	AN3004.OUT 95 REPETS=3
21	EDU885AR	1.0	1	100.0	28.9	2.9	318.0	438.0	AN3004.OUT 96 REPETS=3
22	EDU885AR	0.0	8	100.0	28.9	2.9			AN3004.OUT 97 REPETS=3
23	EDU885AR	0.0	9	100.0	13.1	2.9			AN3005.OUT 105 REPETS=3
24	EDU885AR	0.0	10	80.0	41.9	2.6			AN3006.OUT 114 REPETS=2
25	EDU885AR	1.0	1	80.0	41.9	2.4	206.0	266.0	AN3007.OUT 124 REPETS=2
26	EDU885AR	0.0	9	80.0	41.9	2.4			AN3007.OUT 125 REPETS=2
27	EDU885AR	0.0	9	80.0	41.3	2.0			AN3008.OUT 134 REPETS=2
28	EDU885AR	0.0	10	80.0	41.4	2.3			AN3009.OUT 143 REPETS=2
29	EDU885AR	0.0	10	120.0	24.1	4.9			AN3011.OUT 153 REPETS=2
30	EDU885AR	0.0	10	150.0	20.5	4.7			AN3013.OUT 163 REPETS=2
31	EDU885AR	0.0	10	120.0	23.0	3.7			AN3015.OUT 173 REPETS=2

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### **SECTION III: REPETITIVE & MULTILEVEL AIR DIVES**

#### **C. DC4DR**

- 142 dives: 1 DCS, 0 Marginal
  - All dives were dry
  - Dives were conducted during February 1984 and October 1986
  - Exercise was not required by the "dry non-working subjects" (ref. 1).
  - This data set is included in the report, Statistically Based Decompression Tables VII.
  - Descriptions of the DCS manifestations were provided in ref (1).
- 
1. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F) DCIEM Report 84-R-72, Oct 1984.



### SECTION III: REPETITIVE & MULTILEVEL AIR DIVES

#### C. DC4DR 142 Dives: 1 DCS, 0 Marginal

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
27	-58.5	-1.1	Subject was a dry, resting diver (45 msw/30 min + 45 msw/20 min with 2 hr surface interval) and experienced a slight discomfort in the left shoulder at the 3 msw stop following the second dive. The Doppler reading on his left shoulder was 2/3 at this time. On surfacing, subject also reported discomfort in the left knee and he was treated immediately for Type I DCS with all symptoms relieved on reaching 60 fsw.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC4DR	0.0	5	60.0	30.0	1.1			DD2409R REPETS= 2
2	DC4DR	0.0	4	60.0	30.0	1.1			DD2411R REPETS= 2
3	DC4DR	0.0	5	110.0	12.0	1.7			DD2413R REPETS= 2
4	DC4DR	0.0	3	110.0	12.0	2.0			DD2415R REPETS= 2
5	DC4DR	0.0	4	130.0	8.0	2.3			DD2417R REPETS= 2
6	DC4DR	0.0	4	130.0	8.0	2.3			DD2419R REPETS= 2
7	DC4DR	0.0	4	120.0	10.0	2.1			DD2421R REPETS= 2
8	DC4DR	0.0	4	120.0	10.0	2.1			DD2423R REPETS= 2
9	DC4DR	0.0	5	60.0	50.0	1.0			DD2425R REPETS= 2
10	DC4DR	0.0	5	50.0	75.0	0.9			DD2427R REPETS= 2
11	DC4DR	0.0	3	50.0	75.0	0.9			DD2429R REPETS= 2
12	DC4DR	0.0	4	60.0	30.0	1.1			DD2432R REPETS= 2

13	DC4DR	0.0	5	60.0	30.0	1.1	DD2434R	REPETS= 2
14	DC4DR	0.0	5	110.0	12.0	2.1	DD2436R	REPETS= 2
15	DC4DR	0.0	6	60.0	50.0	1.1	DD2439R	REPETS= 2
16	DC4DR	0.0	4	130.0	8.0	2.3	DD2442R	REPETS= 2
17	DC4DR	0.0	6	120.0	10.0	1.9	DD2444R	REPETS= 2
18	DC4DR	0.0	4	50.0	75.0	1.0	DD2446R	REPETS= 2
19	DC4DR	0.0	4	50.0	75.0	1.0	DD2448R	REPETS= 2
20	DC4DR	0.0	5	60.0	50.0	1.0	DD2450R	REPETS= 2
21	DC4DR	0.0	4	60.0	50.0	1.1	DD2452R	REPETS= 2
22	DC4DR	0.0	8	120.0	40.0	49.5	DR0276A	REPETS= 2
23	DC4DR	0.0	7	150.0	30.0	52.0	DR0278A	REPETS= 2
24	DC4DR	0.0	8	180.0	30.0	89.5	DR0280A	REPETS= 2
25	DC4DR	0.0	8	120.0	40.0	50.3	DR0272R	REPETS= 2
26	DC4DR	0.0	8	150.0	30.0	57.7	DR0274R	REPETS= 2
27	DC4DR	1.0	1	150.0	30.0	57.7	DR0274R	REPETS= 2
28	DC4DR	0.0	9	180.0	30.0	86.2	DR0285R	REPETS= 2
						235.3		
						292.7		

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### **SECTION III: REPETITIVE& MULTILEVEL AIR DIVES**

#### **D. EDU657**

- 142 dives: 4 DCS, 0 Marginal
- All dives were wet, "no temperature controls were maintained during the dives. The temperature was generally comfortable throughout the dive." (reference 1)
- Dives were conducted during November - December 1956
- Exercise: All divers "worked"; dives were "made with a variety of diving suits and approved breathing apparatus" (reference 2).
- Descriptions of the dive procedures and facility were provided in reference 2. The manifestations were taken directly from the dive log (EDU Log #45). The event descriptions were taken verbatim and diagnosed retrospectively on 17 March 1997 using the criteria established by Weathersby in 1988 (Appendix A). The re-diagnoses were made by collective decision of the following:
  - CDR Charles Auker MC USN
  - LCDR Robert Ball MC USNR
  - LCDR Charles Toner MC USN
  - LCDR Daniel Valaik MC USN
  - LT Thomas Buttolph MC USN
  - Edward T. Flynn MD (MC USN RET)

1. M. des Granges. Repetitive Diving Decompression Tables. Navy Experimental Diving Unit Research Report 6-57. 09 January 1957.
2. M. des Granges. Standard Air Decompression Table. Navy Experimental Diving Unit Research Report 5-57. December 1956.

### SECTION III. REPETITIVE & MULTILEVEL AIR DIVES

D. EDU657

142 dives; 4 DCS, 0 Marginals

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
10	-39	9	Bends Table I. Rx began 1532. @6ft (10 sec) partial relief; @24ft (1 min 30 sec) complete relief; @24ft (3 min 45 sec) all rash gone - no pain ( <i>no other description of symptoms</i> )
40	-178	-135	Diver noticed some blurring of vision toward end of 40 ft stop ( <i>second dive</i> ). At 30 ft double-vision became definite and pain developed in both shoulders posteriorly. Reported symptoms after about 11 min at 30. Returned to 40 ft and removed to chamber. Definite but incomplete improvement while at 40 ft. Taken on down to 165 ft after about 10 min. Complete relief at 54 ft (see Rx entry). Frontal headache for 2 hrs after reaching 165. *Note - Diver bent at 30 feet after 11 minutes symptoms, pain upper back & shoulder, double vision - vision OK at 40 feet pain relieved at 54 feet. <i>Notes from Treatment page:</i> Table #3. Subject had onset of double vision, pain across upper back and shoulders with rash over same area. no dizziness, muscle weakness, or change in reflexes or sensation. Hit at 30. Rx began 1105 @40ft vision O.K. (later reported that he still had some blurring of vision); @54ft clear of pain (vision normal) left 50 ft 36 min 48 sec 10:33:48 reached 40 ft 36 min 58 sec 10:33:58 left 40 ft 53 min 58 sec 10:50:58 reached 30 ft 54 min 08 sec 10:51:08
42	-10	51	Subject complained of pain, left shoulder - rash on left side of chest & shoulder. Rx began 1920. @30ft partial relief of pain; @40ft complete relief of pain.
43	120	387	Pain - left knee RT elbow RT shoulder, RT lower chest Rx began 0056. @14ft slight relief; @20ft pain improving; @42ft pain improving; @58ft pain improved but still persists in Rt. elbow; (Rx lasted 4 hr 01 min; no notation of complete relief after entry at 58 ft).

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU657	0.0	2	50.0	40.0	0.9			11/5/56
2	EDU657	0.0	2	40.0	30.0	0.7			11/5/56
3	EDU657	0.0	2	40.0	30.0	0.7			11/5/56
4	EDU657	0.0	2	40.0	50.0	0.7			11/6/56
5	EDU657	0.0	2	40.0	30.0	0.7			11/6/56
6	EDU657	0.0	2	50.0	40.0	0.9			11/6/56
7	EDU657	0.0	2	40.0	30.0	0.7			11/7/56
8	EDU657	0.0	2	40.0	50.0	0.7			11/7/56
9	EDU657	0.0	1	190.0	20.0	31.1			11/7/56
10	EDU657	1.0	1	190.0	20.0	31.1	97.4	145.7	11/7/56
11	EDU657	0.0	2	170.0	5.0	2.9			11/8/56
12	EDU657	0.0	2	35.0	70.0	0.6			11/8/56
13	EDU657	0.0	2	100.0	60.0	38.6			11/8/56
14	EDU657	0.0	2	40.0	90.0	0.7			11/8/56
15	EDU657	0.0	2	35.0	15.0	0.6			11/9/56
16	EDU657	0.0	2	40.0	5.0	0.7			11/9/56
17	EDU657	0.0	2	70.0	5.0	1.2			11/9/56
18	EDU657	0.0	2	120.0	5.0	2.0			11/9/56
19	EDU657	0.0	2	210.0	5.0	4.5			11/13/56
20	EDU657	0.0	2	220.0	5.0	5.7			11/13/56
21	EDU657	0.0	2	30.0	32.0	0.5			11/13/56
22	EDU657	0.0	2	25.0	57.0	0.4			11/13/56
23	EDU657	0.0	2	270.0	5.0	8.5			11/14/56
24	EDU657	0.0	2	35.0	90.0	0.6			11/14/56
25	EDU657	0.0	2	300.0	5.0	11.0			11/14/56
26	EDU657	0.0	2	70.0	25.0	1.2			11/14/56
27	EDU657	0.0	2	190.0	20.0	31.2			11/15/56
28	EDU657	0.0	2	35.0	120.0	0.6			11/15/56

29	EDU657	0.0	2	230.0	10.0	12.8	11/15/56
30	EDU657	0.0	2	280.0	10.0	25.7	11/15/56
31	EDU657	0.0	2	40.0	110.0	0.7	11/16/56
32	EDU657	0.0	2	35.0	160.0	0.6	11/16/56
33	EDU657	0.0	2	300.0	10.0	32.0	11/16/56
34	EDU657	0.0	2	260.0	15.0	42.4	11/16/56
35	EDU657	0.0	2	40.0	160.0	0.7	11/19/56
36	EDU657	0.0	2	120.0	60.0	71.0	11/19/56
37	EDU657	0.0	2	60.0	90.0	12.0	11/19/56
38	EDU657	0.0	2	280.0	20.0	81.6	11/19/56
39	EDU657	0.0	1	260.0	25.0	99.3	11/20/56
40	EDU657	1.0	1	260.0	25.0	99.3	11/20/56
41	EDU657	0.0	2	100.0	60.0	38.6	11/20/56
42	EDU657	1.0	1	140.0	60.0	97.3	11/20/56
43	EDU657	1.0	1	140.0	60.0	97.3	11/20/56
44	EDU657	0.0	2	10.0	19.0	0.2	11/21/56
45	EDU657	0.0	2	10.0	19.0	0.3	11/21/56
46	EDU657	0.0	2	15.0	25.0	0.3	11/21/56
47	EDU657	0.0	2	20.0	39.0	0.3	11/21/56
48	EDU657	0.0	2	100.0	5.0	1.7	11/23/56
49	EDU657	0.0	2	180.0	5.0	3.0	11/23/56
50	EDU657	0.0	2	25.0	48.0	0.4	11/23/56
51	EDU657	0.0	2	150.0	5.0	120.5	11/23/56
52	EDU657	0.0	2	50.0	40.0	0.8	11/26/56
53	EDU657	0.0	2	80.0	20.0	1.3	11/26/56
54	EDU657	0.0	2	70.0	30.0	1.2	11/26/56
55	EDU657	0.0	2	70.0	20.0	1.2	11/26/56
56	EDU657	0.0	2	50.0	50.0	0.8	11/27/56
57	EDU657	0.0	2	120.0	20.0	4.0	11/27/56
58	EDU657	0.0	2	90.0	25.0	0.4	11/27/56
59	EDU657	0.0	2	50.0	60.0	0.8	11/27/56
60	EDU657	0.0	2	100.0	30.0	4.7	11/28/56
61	EDU657	0.0	2	80.0	50.0	11.4	11/28/56

62	EDU657	0.0	2	20.0	30.0	16.0	11/28/56
63	EDU657	0.0	2	60.0	60.0	1.0	11/28/56
64	EDU657	0.0	2	150.0	30.0	34.5	11/29/56
65	EDU657	0.0	2	60.0	100.0	15.0	11/29/56
66	EDU657	0.0	2	190.0	25.0	44.2	11/29/56
67	EDU657	0.0	2	90.0	50.0	19.5	11/29/56
68	EDU657	0.0	2	80.0	130.0	83.3	11/30/56
69	EDU657	0.0	2	150.0	60.0	112.5	11/30/56
70	EDU657	0.0	2	80.0	90.0	47.3	12/4/56
71	EDU657	0.0	2	70.0	130.0	59.1	12/4/56
72	EDU657	0.0	2	190.0	15.0	14.1	12/4/56
73	EDU657	0.0	2	170.0	40.0	81.9	12/6/56
74	EDU657	0.0	2	90.0	100.0	76.5	12/6/56



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### **SECTION III: REPETITIVE & MULTILEVEL AIR DIVES**

#### **E. PARA**

- 135 dives: 7 DCS, 3 Marginal
  - All dives were wet; water temperatures as follows ( $\pm 2^{\circ}\text{F}$ ):

$\leq 90$ min	55°F
91-200 min	60°F
201-300 min	65°F
301-480 min	70°F
$> 480$ min	75°F
  - Dives were conducted during the period June 1991 - January 1992; performed at both NEDU and NMRI
  - Exercise - at depth on a bicycle ergometer; 10 minutes exercise, 10 minutes rest throughout the bottom time
  - Comments and manifestation descriptions were taken from reference 1 and in some cases, of the dives performed at NMRI, from the archived medical folders.
- 
1. Statistically Based Decompression Tables XI: Manned validation of the LE probabilistic decompression model for air and nitrogen-oxygen diving. ED Thalmann, PC Kelleher, SS Survanshi, EC Parker, PK Weathersby. Joint Technical Report, NEDU #1-99 and NMRC #99-01, Naval Medical Research Center, Bethesda, MD. January 1999.

### SECTION III: REPETITIVE & MULTILEVEL AIR DIVES

E. PARA 135 dives: 7 DCS, 3 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	S/S & Comments
6	DCS	-226.8	5	Type I - Right sacroiliac joint pain. A 5 min episode of sacroiliac joint pain 10 min after first dive [of] repetitive profile resolved spontaneously. This recurred 5 min after 2nd dive. Treatment began 15 min post dive. Complete relief after 9 min at 60 fsw. TT6 completed.
9	DCS	-3	10	Type I - Right shoulder pain. Initially intermittent pain progressed to constant pain. Treatment began 40 min post dive. Complete relief after 15 min at 60 fsw. TT6 completed.
13	DCS	120	1020	Type I - Right shoulder pain. Pain first noted upon awakening day after dive. Pain persisted and diver reported for examination. Neuro exam normal. Treatment began 26 hours post dive. Complete relief on descent to 60 fsw. TT5 completed.
15	Marginal	120	360	Niggle: right knee 6 hours post dive; not treated
16	DCS	120	780	Onset time 13 hours post dive. Type I - Right Knee Pain. Type II - Right knee extensor weak. Pain first noted upon awakening day after dive. Upon examination weakness also noted. Treatment began 15 hours post dive. Obtained 50% relief during first O <sub>2</sub> period at 60 fsw, complete relief after 2nd O <sub>2</sub> period. Completed TT6 with 2 extensions at 60 fsw.
18	DCS	120	720	Type I - Left forearm pain. Treatment began 14 hours post dive. Pain reduced after 3 min at 60 fsw and occurred only with wrist movement. This resolved after completion of the TT6.
20	DCS	-280.9	90	Type II - Left leg paresthesias, cerebral signs, cerebellar signs. First symptoms was paresthesia over small area of left anterior tibial region of left leg. Neuro exam showed easy confusion and poor memory recall. Rapid alternating movements slow and awkward and positive Romberg bilaterally. Treatment began 1 h 45 min post dive. After 2 O <sub>2</sub> periods at 60 fsw mental status was normal, there were sensory deficits to pin prick and light touch in and L5/S1 distribution, slight motor weakness in L & R biceps femoris and left quadriceps, slightly decreased but symmetric patellar reflexes, and sustained closure of the L & R ankles. Crossed adductor reflexes present, Babinski equivocal and diver fell backward during Romberg. Over third O <sub>2</sub> period sensory symptoms improved but motor symptoms remained same. After 5 O <sub>2</sub> periods at 60 fsw sensory symptoms improved but persistent, motor strength normal, only one beat of ankle clonus and normal reflexes. Diver remained at 60 fsw 12 hrs and was decompressed following TT7. Approx half way through treatment diver said he felt normal. Neuro exam on surfacing was normal, MRI was normal.
25	DCS	120	300	Type I - Right upper arm pain. Treatment began 7 hours post dive. Complete relief after 10-15 min after compression to 60 fsw. Completed TT6.
27	Marginal	120	300	Niggles. Right clavicle, shoulder / right hand. No treatment.
36	Marginal	120	960	Niggles. bilateral shoulder [pain?]. No treatment.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	PARA	0.0	10	61.5	64.4	1.7			PAA1A01
2	PARA	0.0	9	61.5	69.2	1.4			PAA1A02
3	PARA	0.0	10	61.5	65.8	1.7			PAA1A03
4	PARA	0.0	9	101.5	34.8	3.1			PAA1D01
5	PARA	0.0	9	101.5	34.5	2.8			PAA1D02
6	PARA	1.0	1	101.5	34.5	2.8	36.1	267.9	PAA1D02AD
7	PARA	0.0	8	101.5	37.7	2.4			PAA1D03
8	PARA	0.0	7	101.5	36.4	3.3			PAA1D04
9	PARA	1.0	1	101.5	36.4	3.3	261.5	274.5	PAA1D04
10	PARA	0.0	4	151.5	40.3	132.8			PAA0D01
11	PARA	0.0	3	151.5	40.0	132.9			PAA0D02
12	PARA	0.0	3	151.5	39.8	132.8			PAA0D03
13	PARA	1.0	1	151.5	39.8	132.8	636.4	1536.4	PAA0D03
14	PARA	0.0	2	101.5	59.9	112.1			PAA0C01
15	PARA	0.5	1	101.5	59.9	112.1	689.7	929.7	PAA0C01
16	PARA	1.0	1	101.5	59.9	112.1	689.7	1349.7	PAA0C01
17	PARA	0.0	3	101.5	59.9	112.7			PAA0C02
18	PARA	1.0	1	101.5	59.9	112.7	690.8	1290.8	PAA0C02
19	PARA	0.0	2	101.5	60.1	167.1			PAA0C03
20	PARA	1.0	1	101.5	60.1	167.1	384.8	755.7	PAA0C03
21	PARA	0.0	1	101.5	60.1	167.1			PAA0C03AB
22	PARA	0.0	4	61.5	60.0	1.2			PAA0G01
23	PARA	0.0	4	61.5	60.0	1.2			PAA0G02
24	PARA	0.0	3	61.5	60.0	1.1			PAA0G03
25	PARA	1.0	1	61.5	60.0	1.1	525.5	705.5	PAA0G03

26	PARA	0.0	3	61.5	60.1	1.2			PAA0G04
27	PARA	0.5	1	61.5	60.1	1.2	525.8	705.8	PAA0G04
28	PARA	0.0	4	61.5	60.0	1.3			PAA0G05
29	PARA	0.0	4	61.5	60.1	1.2			PAA0G06
30	PARA	0.0	4	61.5	60.0	1.3			PAA0G07
31	PARA	0.0	4	101.5	25.0	1.9			PAA0H01
32	PARA	0.0	4	101.5	25.0	1.9			PAA0H02
33	PARA	0.0	4	101.5	25.1	1.8			PAA0H03
34	PARA	0.0	4	101.5	25.1	1.8			PAA0H04
35	PARA	0.0	3	101.5	25.0	1.8			PAA0H05
36	PARA	0.5	1	101.5	25.0	1.8	531.3	1371.3	PAA0H05

### **SECTION III: REPETITIVE & MULTILEVEL AIR DIVES**

#### **F. DC4WR**

- 12 dives: 3 DCS, 0 Marginal
- All dives were wet; water temperature not indicated in ref (1)
- Dives were conducted during February 1984
- Exercise consisted of : "wet drives took turns performing, as time permitted, an estimated 100 watts of work on a submerged exercise ergometer set at 50 watts." (ref 1).
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations were provided in reference 1.

1. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F) DCIEM Report 84-R-72, Oct 1984.
2. Nishi RY, BC Eatock, IC Buckingham and G Masurel. XDC-2 digital decompression computer: assessment of decompression profiles by ultrasonic monitoring, Phase II: 30-75 msw. DCIEM Report #81-R-02, January 1981.

### SECTION III: REPETITIVE & MULTILEVEL AIR DIVES

#### F. DC4WR 12 Dives: 3 DCS, 0 Marginal

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
3	-53.1	10	Subject has a slight pain in his right shoulder at the 12 msw stop during ascent from the second dive as wet, working diver (45 msw/30 min + 45 msw/20 min with 2 hr surface interval). This pain disappeared at the 3 msw stop but he had a Doppler score of 3/3 in his right shoulder at this time. The pain recurred 10 mins after surfacing and the subject was treated for Type I DCS with total relief achieved on descent to 60 fsw.
6	119.8	599.8	Subject, a wet, working diver during combination 2 (45 msw/30 min + 45 msw/20 min with 2 hr surface interval) reported feeling something in his right shoulder in the evening following the dive. This feeling persisted the following morning and he was treated for Type I DCS on Table 5, 18 hrs post-dive. His discomfort disappeared during the treatment. Had 3/3 Doppler scores in his right shoulder post-dive.
9	-1.1	15	Subject reported a vague pain in the right shoulder 15 minutes after completion of combination 3 (54 msw/30 min + 18 msw/30 min with 3 hr surface interval) as wet, working diver. Only a few bubbles were observed in the right shoulder (1/1) after the second dives. However, 3/3 bubbles were recorded in the right shoulder during the surface interval. He was treated for Type I DCS on Table 5 and complete relief was attained after 1 min at 60 fsw.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC4WR	0.0	2	120.0	40.0	49.5			DR0276A REPETS=2
2	DC4WR	0.0	1	150.0	30.0	52.0			DR0278A REPETS=2
3	DC4WR	1.0	1	150.0	30.0	52.0	229.1	292.2	DR0278A REPETS=2
4	DC4WR	0.0	2	180.0	30.0	89.5			DR0280A REPETS=2
5	DC4WR	0.0	1	120.0	40.0	50.3			DR0272R REPETS=2
6	DC4WR	1.0	1	120.0	40.0	50.3	388.0	868.0	DR0272R REPETS=2
7	DC4WR	0.0	2	150.0	30.0	57.7			DR0274R REPETS=2
8	DC4WR	0.0	1	180.0	30.0	86.2			DR0285R REPETS=2
9	DC4WR	1.0	1	180.0	30.0	86.2	329.5	345.6	DR0285R REPETS=2





## **SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES**

### **A. EDU184**

- 239 dives: 11 DCS, 0 Marginal
- All dives were wet; water temperature 45-65°F "depending on the length of time in the water and was selected to chill the divers to the point of being uncomfortable without causing dive aborts." (ref 1)
- Dives were conducted during the period July - August 1980
- Exercise - intermittent at depth on a bicycle ergometer, 75 watts. Exercise periods alternated 6 minutes work, 6 minutes rest.
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Comments and manifestation descriptions were taken from reference 1, and were further described through communications between P.K. Weathersby and R.Y. Nishi.

1. Thalmann ED. Phase II Testing of Decompression Algorithms for Use in the U.S. Navy Underwater Decompression Computer. Navy Experimental Diving Unit, Report No. 1-84. January 1984.

## SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES

### A. EDU184 239 dives: 11 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
1	-4.6	10.0	Type I. Right shoulder 10 min post dive. Right shoulder injury age 14. TT5.
5	-5.0	10.0	Type I. Right arm 10 min after 3rd surface interval; TT5
11	-3.8	1.0	Type I. Right shoulder 1 min post dive; TT5
12	-87.5	10.0	Type I. Right shoulder 10 min post dive; pain started during 3rd surface interval. Disappeared on compression at 80 FSW then recurred upon surfacing. TT5.
16	-1.0	5.0	Type I. Right hip, knee 5 min post dive. Excessive fatigue present; TT5
17	-0.9	15.0	Type I. Left shoulder, elbow 15 min post dive; TT5
21	-21.3	0	Type I. Right shoulder at 10 FSW stop on 1st 150 FSW dive; had pain on initial compression to 150 FSW, went away on bottom, recurred at 10 FSW stop, TT6 compression from 10 FSW stop.
22	10.0	40.0	Type I. Left knee 40 min after 2nd 150 FSW dive; TT5
23	-84.9	10.0	Type I. Left hip, knee 10 min after 3rd dive to 100 FSW; knee pain initially during 2nd surface interval; gone after compression to 100 FSW. TT5
33	10.0	25.0	Type I. Right elbow 25 min post dive; TT5
35	-19.6	4.1	Type I. Right knee at 10 FSW stop 2nd dive; compressed to 30 FSW from 10 FSW stop. Did not run during surface interval. TT5.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU184	1.0	1	60.0	75.8	4.7	348.9	363.5	MDC018.OUT 1 REPETS=3
2	EDU184	0.0	9	60.0	75.8	4.7			MDC018.OUT 2 REPETS=3
3	EDU184	0.0	9	60.0	75.6	4.5			MDC019.OUT 11 REPETS=3
4	EDU184	0.0	10	100.0	26.3	6.2			MDC020.OUT 20 REPETS=4
5	EDU184	1.0	1	100.0	22.9	5.5	243.0	258.0	MDC021.OUT 30 REPETS=3
6	EDU184	0.0	9	100.0	22.9	5.5			MDC021.OUT 31 REPETS=5
7	EDU184	0.0	10	60.0	68.7	4.0			MDC022.OUT 40 REPETS=3
8	EDU184	0.0	1	80.0	38.8	3.7			MDC023.OUT 50 REPETS=1
9	EDU184	0.0	9	80.0	38.8	3.7			MDC023.OUT 51 REPETS=4
10	EDU184	0.0	1	80.0	47.4	3.2			MDC024.OUT 60 REPETS=1
11	EDU184	1.0	1	80.0	47.4	3.2	360.9	365.7	MDC024.OUT 61 REPETS=4
12	EDU184	1.0	1	80.0	47.4	3.2	277.2	374.7	MDC024.OUT 62 REPETS=4
13	EDU184	0.0	7	80.0	47.4	3.2			MDC024.OUT 63 REPETS=4
14	EDU184	0.0	10	40.0	207.8	2.4			MDC025.OUT 70 REPETS=2
15	EDU184	0.0	10	40.0	211.9	2.3			MDC026.OUT 80 REPETS=2
16	EDU184	1.0	1	150.0	30.7	66.3	384.2	390.2	MDC027.OUT 90 REPETS=3
17	EDU184	1.0	1	150.0	30.7	66.3	299.1	315.0	MDC027.OUT 91 REPETS=2
18	EDU184	0.0	8	150.0	30.7	66.3			MDC027.OUT 92 REPETS=3
19	EDU184	0.0	1	150.0	42.3	41.1			MDC028.OUT 100 REPETS=2
20	EDU184	0.0	1	150.0	42.3	41.1			MDC028.OUT 101 REPETS=3
21	EDU184	1.0	1	150.0	42.3	41.1	71.6	92.9	MDC028.OUT 102 REPETS=1
22	EDU184	1.0	1	150.0	42.3	41.1	322.1	352.1	MDC028.OUT 103 REPETS=3
23	EDU184	1.0	1	150.0	42.3	41.1	312.1	407.0	MDC028.OUT 104 REPETS=4
24	EDU184	0.0	5	150.0	42.3	41.1			MDC028.OUT 105 REPETS=4
25	EDU184	0.0	1	80.0	42.4	4.4			MDC029.OUT 110 REPETS=3
26	EDU184	0.0	9	80.0	42.4	4.4			MDC029.OUT 111 REPETS=4
27	EDU184	0.0	10	80.0	41.9	4.1			MDC030.OUT 120 REPETS=4
28	EDU184	0.0	1	100.0	23.3	4.7			MDC031.OUT 130 REPETS=3

29	EDU184	0.0	9	100.0	23.3	4.7	MDC031.OUT 131 REPETS=4
30	EDU184	0.0	10	40.0	366.4	2.1	MDC032.OUT 140 REPETS=1
31	EDU184	0.0	10	100.0	33.9	3.6	MDC033.OUT 150 REPETS=4
32	EDU184	0.0	1	60.0	85.6	2.8	MDC034.OUT 160 REPETS=1
33	EDU184	1.0	1	60.0	85.6	2.8	MDC034.OUT 161 REPETS=3
34	EDU184	0.0	8	60.0	85.6	2.8	MDC034.OUT 162 REPETS=3
35	EDU184	1.0	1	150.0	39.1	87.1	MDC035.OUT 170 REPETS=2
36	EDU184	0.0	9	150.0	39.1	87.1	MDC035.OUT 171 REPETS=3
37	EDU184	0.0	10	100.0	64.8	70.0	MDC036.OUT 180 REPETS=2
38	EDU184	0.0	10	120.0	21.6	4.1	MDC037.OUT 190 REPETS=4
39	EDU184	0.0	10	120.0	24.7	3.2	HE1040.OUT 200 REPETS=1
40	EDU184	0.0	10	120.0	24.5	3.3	HE1041.OUT 210 REPETS=1
41	EDU184	0.0	10	120.0	20.7	2.9	HE1042.OUT 220 REPETS=1
42	EDU184	0.0	10	50.0	145.3	3.4	MDC999.NOT 230 REPETS=2

## **SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES**

### **B. PAMLAOS**

- 140 dives: 5 DCS, 3 Marginal
- All dives were wet; water temperatures as follows ( $\pm 2^{\circ}\text{F}$ ):

$\leq 90$ min	55°F
91-200 min	60°F
201-300 min	65°F
301-480 min	70°F
> 480 min	75°F
- Dives were conducted during the period June 1991 - January 1992; performed at both NEDU and NMRI
- Exercise - at depth on a bicycle ergometer; 10 minutes exercise, 10 minutes rest throughout the bottom time
- Comments and manifestation descriptions were taken from reference 1 and in some cases, of the dives performed at NMRI, from the archived medical folders.

1. Statistically Based Decompression Tables XI: Manned validation of the LE probabilistic decompression model for air and nitrogen-oxygen diving. ED Thalmann, PC Kelleher, SS Survanshi, EC Parker, PK Weathersby. Joint Technical Report, NEDU #1-99 and NMRC #99-01, Naval Medical Research Center, Bethesda, MD. January 1999.

## SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES

### B. PAMLAOS 140 dives: 5 DCS, 3 Marginal

Profile #	Outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
3	DCS	120	300	Type I. Awoke from sleep without symptoms but on weight bearing noted burning in both knees. Progressed to a constant dull ache, in knee, L>R. Substantial relief 10 min into 1st O <sub>2</sub> period at 60 fsw leaving only mild residual discomfort in left knee. TT6 with 2 extension at 60 and 30 fsw (extensions done for diver #96 treated concurrently) completed; residual discomfort resolved spontaneously in 3 days.
4	DCS	-347.2	-280.7	Type II. Right forearm paresthesias. First noted paresthesias approximately 60 min into 120 min transit at 30 fsw (4:40 prior to surfacing). Intermittent symptoms persisted after surfacing described as 3 focal areas of tingling on the right forearm. No objective sensory changes noted. At the end of the third O <sub>2</sub> period at 60 fsw symptoms were 50% resolved. Complete resolution occurred 47 min into first O <sub>2</sub> period at 30 fsw; TT6 with 2 extensions at 60 fsw and 30 fsw completed.
6	DCS	120	130	Type I. Left elbow and wrist pain. Complete resolution 6 min into 1st O <sub>2</sub> period at 60 fsw. TT6 (required by diver #61 treated concurrently) completed.
7	DCS	120	150	Type I. Right shoulder pain. Complete resolution 10 min into 2nd O <sub>2</sub> period at 60 fsw. TT6 completed.
8	DCS	13	120	Type II. Lightheadedness. Type I. Left shoulder pain, right inguinal pain. Initially noted left shoulder pain and bilateral lumbar tenderness. Later developed right inguinal pain, progressive shoulder pain, and lightheadedness. Neuro exam normal. Complete resolution of symptoms 10 min into 1st O <sub>2</sub> period at 60 fsw. Persistent mild bilateral lumbar discomfort was felt to be musculoskeletal in origin. TT6 completed.
20	Marginal	120	300	Niggle: left knee
20	Marginal	120	300	Niggle: left knee
23	Marginal	15	120	Niggle: right elbow

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	PAMLAOS	0.0	8	81.5	241.2	113.5			PAAIIA01
2	PAMLAOS	0.0	8	81.5	242.3	167.2			PAAIIA02
3	PAMLAOS	1.0	1	81.5	242.3	167.2	530.2	710.2	PAAIIA02
4	PAMLAOS	1.0	1	81.5	242.3	167.2	63.0	129.5	PAAIIA02
5	PAMLAOS	0.0	7	81.5	242.9	168.8			PAAIIA03
6	PAMLAOS	1.0	1	81.5	242.9	168.8	532.8	542.8	PAAIIA03
7	PAMLAOS	1.0	1	81.5	242.9	168.8	532.8	562.8	PAAIIA03
8	PAMLAOS	1.0	1	81.5	242.9	168.8	425.8	532.8	PAAIIA03
9	PAMLAOS	0.0	10	81.5	482.0	12.2			PAAIIB01
10	PAMLAOS	0.0	9	81.5	482.9	12.3			PAAIIB02
11	PAMLAOS	0.0	9	81.5	482.2	12.2			PAAIIB03
12	PAMLAOS	0.0	9	61.5	511.2	21.7			PAAIIC01
13	PAMLAOS	0.0	1	61.5	511.2	21.7			PAAIIC01AB
14	PAMLAOS	0.0	10	61.5	512.5	21.8			PAAIIC02
15	PAMLAOS	0.0	10	61.5	512.0	22.9			PAAIIC03
16	PAMLAOS	0.0	8	81.5	618.1	32.5			PAAIID01
17	PAMLAOS	0.0	1	81.5	33.1	254.4			PAAIID01AB
18	PAMLAOS	0.0	9	81.5	618.9	32.8			PAAIID02
19	PAMLAOS	0.0	7	81.5	622.8	37.8			PAAIID03
20	PAMLAOS	0.5	2	81.5	622.8	37.8	780.6	960.6	PAAIID03
21	PAMLAOS	0.0	10	61.5	631.2	12.3			PAAIIE01
22	PAMLAOS	0.0	6	61.5	637.6	6.8			PAAIIE02
23	PAMLAOS	0.5	1	61.5	637.6	6.8	659.3	764.3	PAAIIE02
24	PAMLAOS	0.0	10	61.5	630.4	6.9			PAAIIE03

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## **SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES**

### **C. PAMLAOD**

- 134 dives: 6 DCS, 0 Marginal
- All dives were wet; water temperatures as follows ( $\pm 2^{\circ}\text{F}$ ):

$\leq 90$ min	55°F
91-200 min	60°F
201-300 min	65°F
301-480 min	70°F
> 480 min	75°F
- Dives were conducted during the period June 1991 - January 1992; performed at both NEDU and NMRI
- Exercise - at depth on a bicycle ergometer; 10 minutes exercise, 10 minutes rest throughout the bottom time
- Comments and manifestation descriptions were taken from reference 1 and in some cases, of the dives performed at NMRI, from the archived medical folders.

1. Statistically Based Decompression Tables XI: Manned validation of the LE probabilistic decompression model for air and nitrogen-oxygen diving. ED Thalmann, PC Kelleher, SS Survanshi, EC Parker, PK Weathersby. Joint Technical Report, NEDU #1-99 and NMRC #99-01, Naval Medical Research Center, Bethesda, MD. January 1999.

## SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES

### C. PAMLAOD 134 dives: 6 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
2	120	720	Type I. Right shoulder pain; Type II. left arm paresthesias. Noted right arm numbness when going to sleep. Awoke several hours later with right shoulder pain and right arm and forearm paresthesias described as tingling. Neuro exam normal. Complete resolution by end of 3rd O <sub>2</sub> period at 60 fsw except for mild residual discomfort with movement of shoulder. TT6 with 1 ext at 60 & 30 fsw completed. Intermittent right shoulder discomfort resolved spontaneously after several days.
4	15	170	Type II. Left arm paresthesias; Type I. left elbow and upper arm pain. Fleeting (<1 min) left elbow pain 2 hrs post dive. Recurred and persisted 2 hr 50 min post dive with associated upper arm pain and paresthesias. Neuro exam revealed decreased sensation to pin prick in left upper arm. Complete resolution 10 min into 1st O <sub>2</sub> period at 60 fsw. TT6 completed.
5	14	44	Type I. Left shoulder pain; complete resolution 5 min into 1st O <sub>2</sub> period at 60 fsw. TT6 completed.
8	-50.7	-10.7	Type II. Right hand sensory changes. Type I. bilateral elbow pain & right knee pain. Noted onset of bilateral elbow and right knee burning pain and right hypotenar eminence numbness 10 min into the 50 min decompression stop at 10 fsw after the final excursion. No other neurological symptoms. After spending 30 min at the 10 fsw stop diver was recompressed directly to 60 fsw (this was 20 min prior to surfacing). Complete resolution of symptoms on descent. TT6 completed.
13	120	270	Type I. Right knee pain. Pain was initially mild but progressed to deep severe pain over the next 1.5 hrs. Significant relief 5 min into 1st O <sub>2</sub> period at 60 fsw. Complete relief occurred 15 min later. TT6 completed.
15	120	730	Type I. Right knee pain. Awoke morning after dive without symptoms. Upon weight bearing noted pain which progressed to throbbing medial right knee pain. Gradual resolution during 5 O <sub>2</sub> periods at 60 fsw. Complete resolution after 3rd O <sub>2</sub> period at 30 fsw. TT6 with 2 extensions at 60 and 30 fsw completed.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	PAMLAOD	0.0	8	81.5	242.2	130.3			PAAIIB01
2	PAMLAOD	1.0	1	81.5	242.2	130.3	492.5	1092.5	PAAIIB01
3	PAMLAOD	0.0	8	81.5	241.1	125.1			PAAIIB02
4	PAMLAOD	1.0	1	81.5	241.1	125.1	382.2	537.2	PAAIIB02
5	PAMLAOD	1.0	1	81.5	241.1	125.1	381.2	411.2	PAAIIB02
6	PAMLAOD	0.0	10	81.5	361.0	92.4			PAAIIC01
7	PAMLAOD	0.0	9	81.5	361.1	97.3			PAAIIC02
8	PAMLAOD	1.0	1	81.5	361.1	97.3	372.8	412.8	PAAIIC02AD
9	PAMLAOD	0.0	10	81.5	361.3	95.5			PAAIIC03
10	PAMLAOD	0.0	10	81.5	361.5	98.6			PAAIIC04
11	PAMLAOD	0.0	10	61.5	541.2	98.4			PAAIID01
12	PAMLAOD	0.0	9	61.5	540.9	99.1			PAAIID02
13	PAMLAOD	1.0	1	61.5	540.9	99.1	760.0	910.0	PAAIID02
14	PAMLAOD	0.0	9	61.5	541.2	98.0			PAAIID03
15	PAMLAOD	1.0	1	61.5	541.2	98.0	759.2	1369.2	PAAIID03
16	PAMLAOD	0.0	10	61.5	540.1	97.3			PAAIID04
17	PAMLAOD	0.0	9	61.5	541.4	87.0			PAAIID05
18	PAMLAOD	0.0	10	81.5	362.0	189.1			PAAIIE01
19	PAMLAOD	0.0	10	81.5	361.1	188.7			PAAIIE02
20	PAMLAOD	0.0	6	81.5	361.2	182.7			PAAIIE03

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<b>SECTION IV: REPETITIVE &amp; MULTILEVEL NON-AIR DIVES</b>
<b>D. EDU1180R</b>
<ul style="list-style-type: none"><li>• 128 dives: 2 DCS, 0 Marginal</li><li>• All dives were wet; water temperature 73-80°F</li><li>• Dives were conducted during the period 1977-1978</li><li>• Exercise performed at depth on bicycle ergometers; 2 divers simultaneously for periods of 10-20 minutes (25-50 watts), then rotated with 2 other divers (usually 10 divers per trial). This rotation continued throughout the dive.</li><li>• This data set is included in the report, Statistically Based Decompression Tables VII.</li><li>• Manifestation descriptions were taken from reference (1).</li></ul>
<p>1. Thalmann ED, Buckingham IP, Spaur WH. Testing of Decompression Algorithms for use in the U.S. Navy Underwater Decompression Computer. Phase I. NEDU Tech Report 11-80, August 1980.</p>

# SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES

## D. EDU1180R 128 dives: 2 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	S/S & Comments
2	120	360	Type I. 6 hours post dive, left shoulder, elbow, both knees Treatment Table 5
14	30	120	Type II. 2 hrs post dive, right retro-ocular headache, trouble focusing. Treatment Table 6. Diver reported PO <sub>2</sub> between .5 and .5 ATA most of the time because of rig malfunction.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU1180R	0.0	10	150.0	59.7	7.2			DIV331 1 REPETS= 2
2	EDU1180R	1.0	1	125.0	71.3	40.5	482.0	722.0	DIV341 11 REPETS= 4
3	EDU1180R	0.0	9	125.0	71.3	40.5			DIV341 12 REPETS= 4
4	EDU1180R	0.0	9	150.0	61.7	27.4			DIV531 21 REPETS= 2
5	EDU1180R	0.0	10	150.0	44.9	25.1			DIV532 30 REPETS= 2
6	EDU1180R	0.0	9	150.0	46.7	27.5			DIV533 40 REPETS= 2
7	EDU1180R	0.0	10	125.0	40.3	35.9			DIV541 49 REPETS= 3
8	EDU1180R	0.0	10	125.0	50.7	32.3			DIV542 59 REPETS= 3
9	EDU1180R	0.0	10	125.0	45.1	33.0			DIV543 69 REPETS= 3
10	EDU1180R	0.0	10	125.0	40.5	31.9			DIV544 79 REPETS= 3
11	EDU1180R	0.0	10	75.0	35.4	8.9			DIV551 89 REPETS= 5
12	EDU1180R	0.0	10	74.0	36.8	8.0			DIV552 99 REPETS= 5
13	EDU1180R	0.0	10	75.0	36.9	8.4			DIV553 109 REPETS= 5
14	EDU1180R	1.0	1	150.0	37.9	51.5	347.0	437.0	DIV5B1 119 REPETS= 2
15	EDU1180R	0.0	9	150.0	37.9	51.5			DIV5B1 120 REPETS= 2

## **SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES**

### **E. EDU885S**

- 94 dives: 4 DCS, 0 Marginal
- All dives were wet; water temperature ( $\pm 2^\circ\text{F}$ ) set by dive time:
  - $\geq 250$  min  $65^\circ\text{F}$
  - 249-190 min  $60^\circ\text{F}$
  - 179-180 min  $55^\circ\text{F}$
  - $\leq 79$  min  $50^\circ\text{F}$
- Dives were conducted during December 1984
- Exercise: intermittently at depth on a bicycle ergometer (75 watts) at 55-60 rpm
- These dives switched between breathing air and 0.7 ATA  $\text{O}_2$  in  $\text{N}_2$
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations were provided in reference 1.

1. Thalmann, ED. Air- $\text{N}_2\text{O}_2$  Decompression Computer Algorithm Development. Navy Experimental Diving Unit Report No. 8-85. August 1986.

# SECTION IV: REPETITIVE & MULTILEVEL NON-AIR DIVES

E. EDU885S 94 dives: 4 DCS, 0 Marginal

Profile #	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	S/S & Comments
6	120.2	240.2	Right wrist pain 4 hrs post dive. 50% relief on arrival at 60 FSW. 90% relief after 3rd O <sub>2</sub> period. TT6. Mild recurrence at 30 FSW. Recompressed to 46 FSW with complete relief. Decompression on TT6.
8	120.3	840.3	Right shoulder, elbow, knee & ankle pain 14 hrs post dive. Symptoms mild at first upon awakening. Increased over next 6 hrs. Reported for treatment 22 hrs post-dive. Complete relief after 1 O <sub>2</sub> period at 60 fsw. Recurred at 44 fsw. Recompressed to 60 fsw with complete relief after 4 min. Restarted TT6.
9	120.3	4320.3	Left knee pain with mild paresthesia just above left knee 72 hrs post dive. Developed thigh pain during commercial airplane flight. Reported for treatment 18 hrs later. Complete relief during compression to 60 FSW. TT6. At 30 FSW area hyperesthesia over knee occurred and resolved spontaneously. Extended one O <sub>2</sub> period at 30 FSW.
11	30	120	Right wrist pain 2 hrs post dive; right shoulder pain 2/5 hrs post dive. Wrist pain upon arrival at 60 FSW. Shoulder pain gone after 2nd O <sub>2</sub> period. TT6. Shoulder pain recurred at 30 FSW. Compressed to 60 FSW. Only slight relief at 60 FSW. TT6. All symptoms gone by end of treatment.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU885S	0.0	9	100.0	93.2	125.0			[.EDURA W]AN2013.OUT;1
2	EDU885S	0.0	10	100.0	93.3	124.5			[.EDURA W]AN2014.OUT;1
3	EDU885S	0.0	9	150.0	43.2	64.6			[.EDURA W]AN2015.OUT;1
4	EDU885S	0.0	10	150.0	47.8	64.3			[.EDURA W]AN2016.OUT;1
5	EDU885S	0.0	9	80.0	52.5	1.2			[.EDURA W]AN3010.OUT;1
6	EDU885S	1.0	1	80.0	52.5	1.2	449.0	569.0	[.EDURA W]AN3010.OUT;1
7	EDU885S	0.0	8	80.0	63.1	1.2			[.EDURA W]AN3012.OUT;1
8	EDU885S	1.0	1	80.0	63.1	1.2	490.0	1210.0	[.EDURA W]AN3012.OUT;1
9	EDU885S	1.0	1	80.0	63.1	1.2	490.0	4690.0	[.EDURA W]AN3012.OUT;1
10	EDU885S	0.0	7	80.0	52.9	1.3			[.EDURA W]AN3014.OUT;1
11	EDU885S	1.0	1	80.0	52.9	1.3	374.4	464.4	[.EDURA W]AN3014.OUT;1
12	EDU885S	0.0	10	80.0	64.1	1.1			[.EDURA W]AN3016.OUT;1
13	EDU885S	0.0	9	60.0	123.2	34.2			[.EDURA W]AN3017.OUT;1
14	EDU885S	0.0	9	60.0	124.1	34.0			[.EDURA W]AN3018.OUT;1







## **SECTION V: AIR & O<sub>2</sub> DECOMPRESSION**

### **A. NMR94EOD**

- 284 dives: 17 DCS, 9 Marginal
- All dives were dry
- Dives were conducted from February - September 1994
- Exercise: bicycle ergometer, workload 100 watts, 10 minutes on, 10 minutes off while on bottom (20 minutes on, 20 minutes off for dives with long bottom times)
- Descriptions of the DCS manifestations and dive descriptions were provided in reference 1. Additional description information was incorporated directly from the archived medical files of the subjects. The descriptions shown here reflect a diagnostic consensus performed retrospectively by a group of DMOs who met specifically to address confirmation of diagnoses. Meeting was held on 30 June 1998 at NMRI. DMOs:

CAPT Charles Auker	LCDR Robert Ball
LCDR Daniel Valaik	LT James Caviness
LT David Dromsky	LCDR Charles Toner

1. Survanshi SS, ED Thalmann, EC Parker, DD Gummin, AP Isakov, LD Homer. Dry Decompression Procedure using Oxygen for Naval Special Warfare. Naval Medical Research Institute, Technical Report No. 97-03, April 1997.

## SECTION V: AIR AND OXYGEN DECOMPRESSION

A. NMR94EOD 284 dives: 17 DCS, 9 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	S/S
9	DCS	10	120	Presented to medical approx 2 hrs post-dive, c/o pruritus and transient right and left knee pain. Claimed symptoms started about one hour after surfacing. Also complained of feeling tired and generally achy. On examination, diver had a macular, erythematous, pruritic rash on his arm, chest, abdomen and back. No evidence of skin pallor or cyanosis. No evidence of cutis marmorata. Neurological exam was unremarkable. The knees were examined and flexed through a full range of motion without pain, though the diver did on occasion complain of transient discomfort in both knees, R>L. Diver was pressed to 60 fsw and placed on 100% O <sub>2</sub> . Knee pain had completely resolved upon reaching 60 fsw and the rash began showing improvement within ten minutes. The subject was treated on USN TT5. The diver emerged with no pain, no c/o itching and only a small area of residual erythema on the posterior aspect of the upper right arm. The diver was observed at the chamber for 2 hrs post-Rx without recurrence of symptoms and again 18 hours post surfacing without complaint and no evidence of residual skin symptoms. The diver's neurological exam remained normal throughout the course of this incident.
11	Marginal	121	630	No complaints at the 10 min or 2 hr checks. At the 24 hr check, diver reported that approx 10 hr after surfacing, he experienced a low grade (3/10) intermittent pain that varied with activity in the right shoulder joint. The pain resolved completely and lasted only a short time.
15	DCS	30	78	No complaints at the 10 minute or 30 minute post-dive checks. 78 min after surfacing, the patient noted acute onset of mild retropatellar "gnawing" right knee pain, which was reproducible with passive mild hyperextension of the right knee. Within 10 min of symptoms onset, right knee pain had increased to 5/10 (subjectively) in severity, and patient began to notice milder (1/10) retropatellar left knee pain as well. Patient had a normal neuro exam at this time and agreed to watchful waiting to facilitate Dx. By 14:55 (108 min post-surfacing) left knee pain had worsened to 8/10, and patient developed acute left "elbow" pain. Passive hyperextension of both knees elicited worsening of symptoms, and point palpation of left bicipital tendon reproduced & exacerbated "elbow" pain. Neuro exam was completely intact, except patient noted subjective, "numbness" along lateral border of left forefoot. Sensation, motor function and reflexes were all intact and remainder of neuro was normal. Patient was placed on 100% and taken to 60 fsw in the MRCC. All symptoms including left foot "numbness" resolved by the time Pt reached depth. Neuro by DMT on reaching 60 fsw was normal.
23	DCS	10	81	Diver surfaced at 1124, 21 Mar 94. Was asymptomatic at the 10 min check. At 1245 he complained of left shoulder pain, associated with numbness and paresthesia from the left elbow down to the left thumb, index and middle finger. Neuro exam by DMO at that time was unremarkable. Patient was pressed to 60 fsw at 1306. Left shoulder pain resolved within minutes of reaching bottom. After the first O <sub>2</sub> period much of the numbness disappeared with persistent symptoms in the left thumb (DIO to tip). These residual symptoms resolved completely

23 (cont)				<p>during the 2nd O<sub>2</sub> period. Diver surfaced asymptomatic from an extended USN TT6. 15-20 min after surfacing, diver experienced paresthesia in left C6-C7 dermatomal distribution, with numbness and tingling traveling up the radial aspect of the forearm. Neuro exam confirmed an area with decreased sensation to pinprick in the same distribution. The diver was immediately recompressed to 60 fsw. During compression the paresthesia proximal to the wrist resolved and all other symptoms resolved during the 2nd O<sub>2</sub> period with exception of persistent paresthesia in the fingertips of the left thumb, index and middle fingers. Upon surfacing, the paresthesia persisted in the fingertips with hypesthesia to pinprick. No motor signs or deep tendon reflex abnormality was noted. Diver was admitted to NNMC neurology for observation and evaluation. Follow-up eval on 22 Mar 94 by NNMC neurology demonstrated asymmetric nystagmus and weakness in the left wrist extensor and ankle. There was also a question of instability on Romberg post-treatment. Because of concern for pulmonary O<sub>2</sub> toxicity, the diver was treated on a modified clinical HBO profile at 45 fsw, and was re-evaluated by neurology. Neuro-ophthalmologic consultation revealed a lateral gaze paresis on the left consistent with internuclear ophthalmoplegia (INO). Diver, in consultation with DMOs, neurologists, and the neuro-ophthalmologist, elected re-treatment on a USN TT7 which was begun that evening. Diver suffered moderate mid-chest and throat irritation during the latter stages of O<sub>2</sub> delivery at 60 fsw, despite humidification of breathing gas. His symptoms resolved completely by the end of the 12 hrs at 60 fsw and no objective findings were evident after the first 12 hrs at 60 fsw. Fingertip paresthesia recurred at 24 fsw during decompression, with diminished sharp/blunt discrimination in the fingertips of the thumb, index, and middle finger. He was recompressed to 29 fsw, and given Dexamethasone, 16 mg, iv x1, followed by 4 mg, po, q6h. This offered complete relief, including loss of objective findings, after the first four hours. Diver reported recurrence, though mild, of fingertip paresthesia at 12 fsw during subsequent decompression, which persisted throughout decompression to the surface. Upon neuro exam, however, no abnormalities were noted. Fingertip sensation was intact to soft touch, PP, and two-point discrimination. Diver surfaced from TT7 at 1100, 25 Mar 94. Neuro eval by NNMC neurologist at that time was non-focal. He was admitted for 24 hour observation and released. MRI revealed no significant abnormalities.</p>
24	Marginal	120	450	No complaints at the 10 min or 2 hr checks. At the 24 hr check, diver reported that approx 8 hr post dive he noticed a mild pain in his left shoulder, described it as "fleeting". No other symptoms or problems since then.
25	Marginal	30	180	No complaints at the 10 min or 2 hr checks. At the 24 hr check, diver reported that he had noted a mild fleeting pain in his right shoulder while breathing O <sub>2</sub> at the 40 ft stop during the dive yesterday. Approx 3 hr after surfacing the pain recurred, 2/10 severity, dull, throbbing, intermittent. It persisted on and off for approx 9 hr but had resolved completely without recurrence when he reported for the 24 hr check.
27	DCS	120	230	Diver surfaced 1406, 22 Mar 94; no complaints at 2 hr recheck and was released. While driving home at 1730 began to notice 2/10 "gnawing" bilateral anterior knee pain, which worsened to 5/10 subjectively by 1755. On interview at 1855 subject had 8/10 bilateral knee pain and 2-3/10 bilateral ankle pain. The right knee pain radiated into the right hip. No other symptoms. Neuro exam was completely intact on the surface. Subject was taken to 60 fsw on O <sub>2</sub> in the MRCC; had complete relief of all symptoms except persistent 2/10 right knee pain by the time he reached 60 fsw. All complaints were completely resolved by 10 min into the first O <sub>2</sub> breathing period at 60 fsw. TT6 was elected, merely because it was operationally facilitated by another concurrent treatment.

28	DCS	120	1020	<p>Diver surfaced from dive at 1406, 22 Mar 94; had no complaints or findings at the 10 min &amp; 2 hr post-dive checks. Approx 6 hr post-dive noted transient 2/10 aches in right elbow approx one/hour, lasting approx 15 minutes. At 0700 the next morning, during eval, diver reported this history to the DMO; also reported that the pain remained in his right elbow, approx 2/10 in severity. Diver was recompressed to 60 fsw on 100% O<sub>2</sub>, with no early resolution of the pain during the first O<sub>2</sub> period. Pain improved to 1/10 by the end of the third O<sub>2</sub> period on a USN TT6 and resolved by the end of one O<sub>2</sub> extension on at 60 fsw. Except for a mild left antecubital hematoma suffered during a blood draw at 30 fsw, diver surfaced from TT6 asymptomatic. The neuro exam was unremarkable through the course of this episode.</p>
30	Marginal	120	510	<p>No complaints at the 10 min or 2 hr checks. At the 24 hr check, diver complained of two episodes of right knee pain. One occurred approx 8.5 hr post-dive and the second occurred approx 18 hr after surfacing. Each lasted 20-25 min without other symptoms. Pain had resolved without recurrence at the 24 hr check.</p>
33	Marginal	30	120	<p>No complaints at the 10 min check. At the 2 hr check, diver reported an intermittent left elbow pain; 3 times/hour, duration 2-3 min. Pain was described as non-radiating, a dull (2/10) ache. No complaints at the 24 hr check. Some time later (date/time not specified) diver reported increasing pain from the left elbow radiating to the left 4th and 5th digits beginning approx 48 hr post-dive. Described these as similar to niggles he had experienced in the past.</p>
37	DCS	120	1251	<p>Diver initially noted intermittent pain in his left elbow lasting 30 seconds, 3-4/10 in intensity. This pain dissipated approx 2 hrs after the dive. He then reported experiencing a 3-4/10 pain in his left shoulder beginning at 1530 on his drive home from the dive series. The pain remained at this level for 3 hrs and subsided to 3-1/10. This low grade pain remained throughout the night and was reported at follow-up in the AM 0720 12 Apr 94. Neuro exam revealed no abnormality. Subject was pressed to 60 fsw and experienced relief at 15 min on 100% O<sub>2</sub>. Pain decreased to 1/10 from 3/10. Neuro exam on bottom was unchanged. Pain completely resolved 10 min into the first O<sub>2</sub> extension on TT6. Completed TT6 with 2 ext at 60 fsw. Patient had normal neuro exam throughout treatment and on surface post-treatment.</p>
40	DCS	30	73	<p>Upon reaching the surface at 1248 the diver experienced pruritus in a generalized distribution. Itching was considered minor and decreased over time. This symptoms was shared by all members of the five man dive team. At 1401 pt experienced a low grade pain in his wrist 1/10 in severity. This was soon accompanied by a similar pain in his shoulder 1/10 in severity. Pt also noticed an erythematous rash across his chest. At approximately 1445 he reported this to his dive supervisor and the DMO was contacted. Pain was a non-radiating, dull ache that did not change with motion, 2/10 in severity, located in the patient's wrist and shoulder. Rash was erythematous and pruritic. Upon examination, an erythematous rash was observed on patient's chest in an 8 X 12 cm distribution and 5 X 6 cm distribution on his right shoulder. Neuro non-focal. Patient was recompressed to 60 fsw on 100% O<sub>2</sub>. Wrist pain and shoulder rash resolved on descent. Right shoulder pain resolved 7 mins into the first O<sub>2</sub> period. Upon reaching the surface, all symptoms had resolved. Exam was repeated. No residual complaints or objective findings were noted.</p>
41	DCS	120	270	<p>Diver reported some itching at the 10 minute check, but no other symptoms. At the 2 hr check he reported that the itching had decreased; no other complaints. At the 24 hr check he reported that 4.5 hr post-dive he experienced transient left knee pain, a "niggle" that lasted approximately 2 hours. It had completely resolved by the 24 hr check.</p>

43	DCS	-1.4	20	<p>Diver surfaced at 1428, 15 Mar 94, complaining only of itching on his arms, legs and back. Had no rash or any other complaint. At 1448, the diver noted a pain developing in his right knee. Pain increased to 4/10 severity when the diver presented to DMO at 1505 for evaluation. Neuro exam was unremarkable. Diver was recompressed to 60 fsw on 100 O<sub>2</sub> at 1512 with complete resolution of pain at 40 fsw on his way to 60 fsw. The diver was treated on USN TT6. Tender noted a two inch area of erythema on diver's back during the course of the treatment. This macular, non-pruritic, mildly erythematous area had slightly increased sensitivity to soft touch, feeling "like a sunburn" to the diver. The diver had no other complaint. Neurological examination was normal. The sensation and mild erythema resolved gradually after 3-4 days.</p>
44	DCS	-1.4	30	<p>Diver surfaced at 1428, 15 Mar 94, immediately complaining of itching on his arms, legs and back. Approx 10 min post-dive, diver complained of vague lower abdominal discomfort. The diver otherwise had no complaint. At 30 min post-dive, diver reported to the DMO pain radiating from his back to the left knee,, described as 8/10 in intensity. Diver was recompressed to 60 fsw on 100 % O<sub>2</sub> with complete relief of all symptoms upon reaching 60 fsw. The diver was treated on a USN TT6 without complication. The exam at 2 hrs and 18 hrs post-treatment were unremarkable. Neuro exam revealed no deficit. Diver was without complaint and reported feeling fine.</p>
46	DCS	120	833	<p>Diver surfaced complaining of itching of arms, legs and back but detailed physical exam was unremarkable. A 2 hr post-dive interview revealed that the itching had resolved and he had no other complaint. The diver felt well throughout the day and retired asymptomatic at 2330 that evening. At 0300, ~ 14 hrs after surfacing, diver awoke with left shoulder pain, and numbness in the thumb, index &amp; middle fingers of left hand. He was examined by a physician at 0415, and described the shoulder pain as aching in character, persistent 3/10 in intensity, unaffected by movement. No other joint pain was reported. Neuro exam revealed a marked decrease in sensation to pin-prick, light touch and 2-point discrimination over the palmar and dorsal surface of the thumb, index, middle finger and corresponding palmar area of the left hand. Physician noted affected area to be in a "median nerve distribution", involving no area proximal to the wrist. Diver complained of some subjective decrease of grip strength on the affected side but exam revealed no objective weakness. The neuro exam was otherwise unremarkable. Diver was recompressed to 60 fsw on 100% O<sub>2</sub> according to USN TT6. Complete relief of the left shoulder pain achieved within 10 min of starting the first O<sub>2</sub> period. The sensation of numbness in the left hand gradually improved first becoming a "pins &amp; needles" sensation, then with return of normal sensation by the end of the second O<sub>2</sub> period. USN TT6 was completed without extensions. At surface the diver was completely asymptomatic and post-treatment neuro exam was normal. Repeated post-treatment checks throughout the course of the day were unremarkable. Diver returned the next morning complaining of recurrence of symptoms in his left hand, with "tingling &amp; numbness" in the tips of the thumb, index, &amp; middle finger, involving an area of the skin from the distal interphalangeal joints. He noted symptoms were exacerbated when firmly gripping objects with the affected hand. Neuro exam again revealed decreased sensation over the distal thumb, index and middle finger of the left hand. Diver was recompressed a 2nd time on TT6 but achieved no improvement in symptoms or signs. Treatment by wrist splint and oral ibuprofen, 600 mg QID was started as for conventional carpal tunnel syndrome. That morning the treatment team elected to give 3rd treatment on TT6. During this he reported subjective improvement of symptoms which persisted on completion of the treatment. The numbness of the thumb had completely resolved and the numbness of the index and middle finger now involved only the very tips of the digits. The neuro exam was consistent with the reported improvement. No further hyperbaric treatments were performed, but wrist splinting and ibuprofen were continued for a further seven days by which time all symptoms had resolved.</p>

47	Marginal	120	203	Diver reported itching of arms, ears and back at the 10 min check. At 2 hr check he reported that the itching had lasted 1.5 hr, no rash, no joint pain. At the follow-up check the next morning (18 hr after surfacing) he reported that 3.5 hr post-dive he experienced a dull right hip pain that lasted approx 5 min, resolved completely without recurrence.
48	Marginal	120	353	Diver reported itching of arms and legs at the 10 min check. At the 2 hr check there was some residual itching of the right leg, but no rash. At the 24 hr check he reported that approx 1800 the night before he had a minor joint ache in the right wrist that resolved in an hour. No symptoms at the 24 hr check.
49	Marginal	120	803	Diver reported itching of arms, legs and forearms at the 10 min check. At the 2 hr check he reported that the itching had resolved after 30 min. At the follow-up check the next morning (18 hr after surfacing) he reported that he had experienced a mild ache on his left ankle that resolved after 15 minutes. No time of onset recorded. Completely resolved at the time of the exam.
51	DCS	120	210	Approx 3.5 hrs post-dive diver felt "achy" in his thighs and knees, and was feeling tired. While taking a hot shower the diver had a period of LOC after which he found himself on his knees. Upon trying to stand, the diver had a second period of LOC after which he found himself supine. No h/o vertigo, nausea, palpitation or incontinence. Diver did complain of some lightheadedness just prior to LOC. Upon regaining consciousness, diver immediately sought medical attention. Total time of LOC in unclear but is estimated at less than 10 minutes. Diver was evaluated at NMRI by the DWMO not more than 20 min after the incident. Pt c/o 3/10 aching of quads and knees. No other joint pain or complaints. Exam showed the diver's sensorium was completely intact. Diver was alert and oriented. Neuro exam revealed hip flexor weakness (4/5) bilaterally. There was no other neuro deficit. Because of n/o LOC, orthostatic BP was taken. The diver had BP 120/80 P 80 while lying down and 120/75 P 106 while standing. Diver claimed a good liquid intake and clear urine during the dive. Diver pressed to 60 fsw with bilateral leg ache resolution from 3/10 to 1/10 upon reaching bottom. Aching had completely resolved by the third O <sub>2</sub> period. Diver received 2 liters of IV fluid during recompression. The diver was treated on a USN TT6 with one extension at 60 fsw. Upon surfacing, diver had no complaints. Aching legs completely resolved. Neuro exam revealed no abnormality with complete resolution of hip flexor weakness. Diver was admitted to NNNMC Neurology Service for overnight observation. Eval by NNNMC staff neurologists the next morning revealed slight hyperreflexia of the patellar and Achilles reflex, L>R. Also absence of the abdominal reflexes was noted. The neuro exam was otherwise normal. Based on the finding a recommendation was made to retreat on USN TT6. This was done 18 Mar 94. Post-treatment neuro exam showed return of abdominal reflexes. A 3rd TT6 was recommended by NNNMC Neurology in light of abdominal reflex resolution on the last treatment, but with persistent hyper-reflexia of L patellar reflex over baseline. Diver was treated on TT6 19 Mar 94. Diver still had brisk patellar reflexes post-treatment. NNNMC staff neurologist evaluated the diver on evening of 19 Mar 94; diver was asymptomatic and without complaint. Neuro exam was completely normal, except for slightly brisk patellar reflexes L>R.
52	Marginal	120	415	No complaints at the 10 min; at the 2 hr check, diver complained of "some itching". At the 24 hr check, he reported that approx 7 hr post dive he experienced intermediate pain in both knees and ankles, his right shoulder and right wrist. Described the pain at 3/10, but that his itching had reduced by 1600 (~ 3 hr post dive). He was asymptomatic at the 24 hr check.



54	DCS	20	1118	<p>Surfaced 1107, 21 Apr 94. Diver had no symptoms on going to bed at 2230 that night, and stated that he slept and awoke on his left side. On awakening, he noted right triceps "muscle" pain rated subjectively 2/10 in severity. He also noted paresthesia, described as "icy cold" feeling and "tingling" in palm of right hand and throughout entire right middle finger. No other pain or symptoms noted. Diver noted symptoms not changing in severity during the hour after awakening. Pt is right hand dominant. Neuro exam demonstrated 4/5 extensor weakness in right triceps, wrist and finger extensors. Light touch sensation was somewhat diminished on the ulnar aspect of the right middle finger, but 2-point sensation was intact. No tenderness on palpation of right triceps. Exam was otherwise intact. Diver was pressed to 60 fsw on O<sub>2</sub> in the MRCC. His extensor weakness completely resolved within minutes at depth. The paresthesia was gone by the end of the second breathing period. Pt underwent two extensions at 60 fsw, and by the time he reached 30 fsw on ascent the triceps pain had resolved. He received one extension at 30 fsw. No recurrence or residual symptoms and a completely normal neuro exam at 6 hrs post-treatment.</p>
55	DCS	120	1260	<p>Diver surfaced at 1107. Had mild forearm and thigh itching transiently post-surfacing and that evening noted fleeting right ankle pain at about 1815 that lasted only a few seconds. Patient had no complains at morning follow-up 0645, 22 Apr 94. At 0700 patient did the Command PRT, conducting the maximal required push-ups and swim. As approx 0800 patient noted a "funny" feeling in his left posterior shoulder which he described as feeling like "dead skin" but denied numbness, tingling, or pain. The involved area reportedly extended over left scapular region and over the left triceps and patient described a similar sensation over ulnar aspect of left hand and 5th digit. He noted a cold sensation radiating down left arm several minutes before presenting at 0940. He reported no other symptoms until about 1000 when he noted similar hypesthesia on lateral left thigh. Neuro exam was completely intact, including light touch sensation in the regions described. Pt was conservatively treated on a TT6 with 2 extensions at 60 fsw and 2 ext at 30 fsw. His left arm/shoulder symptoms improved to the point that the "funny feeling" had reduced to about the size of a half-dollar on the posterior aspect of the left upper arm. The hand symptoms resolved. The left thigh region remained subjectively hypesthetic from the hip to mid-thigh laterally post-treatment. No objective findings were noted at two hours post-treatment. his exam was intact when he went home at 2100. On awakening the next a.m. he noted that he was somewhat fatigued, "slow" and "confused" throughout the day. He had no other specific symptoms, but noted that the subjectively hypesthetic area on the lateral left thigh had diminished to a coin-sized spot, and that the similar area on his left upper arm had resolved and now felt completely normal. Pt had no other c/o's and feels otherwise well. Neuro exam was completely intact. No objective hypesthesia noted. MSE intact, except that Pt appeared somewhat lethargic and appears to have slowed reaction times. On neuropsych battery testing, Pt missed one letter on the trails, and calculation times were slightly slowed from baseline (&lt;10%). His lack of objective findings indicated that a decompression-related etiology was unlikely, but conservatively, and in consultation with our neurologist, he was re-treated with a TT6. He was admitted to the neuro service at NMMC for overnight observation and released.</p>
58	DCS	10	80	<p>Diver surfaced from dive at 1050, 03 May 94. He was asymptomatic at the 10 min medical evaluation. At one hour post-dive he noted "burning sensation" in area over right triceps including the triceps tendon insertion at the olecranon. At approx 1 hr and 20 min diver noted approx 3/10 right elbow pain. Diver reported this pain to the DMO at the 2 hr post-dive check. Physical exam was unremarkable. The pain in the right elbow was unrelieved with mechanical manipulation. Neuro exam was unremarkable. Diver was recompressed to 60 fsw on 100% oxygen. Diver had quick relief of right elbow pain, and "burning sensation" with complete relief of symptoms 18 minutes into the first O<sub>2</sub> period. Diver completed USN TT6. Diver had no post-treatment complications.</p>

61	DCS	120	1057	<p>Diver surfaced from dive at 1053, 05 May 94. Was asymptomatic at the 10 min and 2 hour medical evals. Diver felt completely fine upon going to sleep at 2130 that evening. Diver awoke at 0430 and noted 3/10 pain in left shoulder. Diver had some intermittent radiation of pain down medial aspect of left upper arm. Diver presented to NMRI for evaluation at 0630 without relief or change in character of the pain. Pain was described as diffuse joint pain. Diver denied further radiation of pain. Exam by DMO revealed no neurologic abnormality. Physical exam was unremarkable. Diver was recompressed to 60 fsw on 100% O<sub>2</sub> and had improvement of pain from 3/10 to 1/10 upon reaching 60 fsw. Diver had complete relief of pain at 5 min into the first O<sub>2</sub> period. It was elected to treat the diver on a TT6, though TT5 would be acceptable. Follow-up exam was normal.</p>
80	DCS	42	1162	<p>Diver surfaced from the dive at 1029, 30 Aug 94. Had no complaints or findings at the 10 min or 2 hr post-dive checks. Upon awakening the next morning, the diver noted a dull ache in his left knee, 2/10 intensity, which would not resolve. Physical exam was unremarkable. The neurological exam revealed no deficit. The diver was recompressed to 60 fsw on 100% O<sub>2</sub> with complete resolution of the symptoms 11 mins into the first O<sub>2</sub> period. The diver completed a USN TT6 with complete resolution of all symptoms. He remained asymptomatic and had no complaint on morning follow-up. The diver returned to diving, after evaluation, 7 days later.</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	nmr94eod	0.0	4	60.0	239.8	74.3			EOD0B01
2	nmr94eod	0.0	1	60.0	239.8	74.3			EOD0B01
3	nmr94eod	0.0	5	60.0	240.1	73.5			EOD0B02
4	nmr94eod	0.0	5	60.0	239.9	74.7			EOD0B03
5	nmr94eod	0.0	5	60.0	239.9	74.1			EOD0B04
6	nmr94eod	0.0	5	60.0	240.0	75.1			EOD0B05
7	nmr94eod	0.0	5	60.0	240.0	73.8			EOD0B06
8	nmr94eod	0.0	4	60.0	239.9	75.1			EOD0B07
9	nmr94eod	1.0	1	60.0	239.9	75.1	346.1	436.1	EOD0B07
10	nmr94eod	0.0	4	60.0	239.9	74.4			EOD0B08
11	nmr94eod	0.5	1	60.0	239.9	74.4	435.6	915.6	EOD0B08
12	nmr94eod	0.0	5	60.0	239.9	74.2			EOD0B09
13	nmr94eod	0.0	5	60.0	239.5	77.3			EOD0B10
14	nmr94eod	0.0	4	60.0	240.0	73.0			EOD0B11
15	nmr94eod	1.0	1	60.0	240.0	73.0	344.2	402.2	EOD0B11
16	nmr94eod	0.0	5	60.0	240.0	74.3			EOD0B12
17	nmr94eod	0.0	5	60.0	179.9	24.0			EOD0A01
18	nmr94eod	0.0	4	60.0	180.0	24.7			EOD0A02
19	nmr94eod	0.0	1	60.0	180.0	24.7			EOD0A02
20	nmr94eod	0.0	5	60.0	179.9	24.0			EOD0A03
21	nmr94eod	0.0	5	60.0	179.9	23.9			EOD0A04
22	nmr94eod	0.0	2	60.0	180.0	24.1			EOD0A05
23	nmr94eod	1.0	1	60.0	180.0	24.1	215.3	286.3	EOD0A05
24	nmr94eod	0.5	1	60.0	180.0	24.1	325.3	685.3	EOD0A05
25	nmr94eod	0.5	1	60.0	180.0	24.1	0.0	0.0	EOD0A05
26	nmr94eod	0.0	3	60.0	180.2	24.0			EOD0A06
27	nmr94eod	1.0	1	60.0	180.2	24.0	325.2	434.2	EOD0A06

28	nmr94eod	1.0	1	60.0	180.2	24.0	325.2	1225.2	EOD0A06
29	nmr94eod	0.0	4	60.0	179.9	24.2			EOD0A07
30	nmr94eod	0.5	1	60.0	179.9	24.2	325.4	1285.4	EOD0A07
31	nmr94eod	0.0	5	60.0	179.8	24.2			EOD0A08
32	nmr94eod	0.0	4	60.0	180.0	23.8			EOD0A09
33	nmr94eod	0.5	1	60.0	180.0	23.8	215.0	325.0	EOD0A09
34	nmr94eod	0.0	5	60.0	179.9	24.0			EOD0A10
35	nmr94eod	0.0	3	60.0	180.0	24.6			EOD0A11
36	nmr94eod	0.0	1	60.0	180.0	24.6			EOD0A11
37	nmr94eod	1.0	1	60.0	180.0	24.6	181.2	1456.8	EOD0A11
38	nmr94eod	0.0	5	60.0	180.0	24.1			EOD0A12
39	nmr94eod	0.0	3	150.0	59.9	47.0			EOD0C01
40	nmr94eod	1.0	1	150.0	59.9	47.0	138.2	225.2	EOD0C01
41	nmr94eod	1.0	1	150.0	59.9	47.0	228.2	378.2	EOD0C01
42	nmr94eod	0.0	3	150.0	60.0	48.3			EOD0C02
43	nmr94eod	1.0	1	150.0	60.0	48.3	106.9	146.4	EOD0C02
44	nmr94eod	1.0	1	150.0	60.0	48.3	106.9	139.4	EOD0C02
45	nmr94eod	0.0	1	150.0	59.9	63.3			EOD1C01
46	nmr94eod	1.0	1	150.0	59.9	63.3	244.4	964.4	EOD1C01
47	nmr94eod	0.5	1	150.0	59.9	63.3	244.4	1204.4	EOD1C01
48	nmr94eod	0.5	1	150.0	59.9	63.3	244.4	1564.4	EOD1C01
49	nmr94eod	0.5	1	150.0	59.9	63.3	244.4	1204.4	EOD1C01
50	nmr94eod	0.0	3	150.0	59.9	63.1			EOD1C02
51	nmr94eod	1.0	1	150.0	59.9	63.1	244.2	354.2	EOD1C02
52	nmr94eod	0.5	1	150.0	59.9	63.1	244.2	1564.2	EOD1C02
53	nmr94eod	0.0	3	150.0	55.0	102.5			EOD2C01
54	nmr94eod	1.0	1	150.0	55.0	102.5	278.8	1276.8	EOD2C01
55	nmr94eod	1.0	1	150.0	55.0	102.5	278.8	1511.8	EOD2C01
56	nmr94eod	0.0	5	150.0	54.9	101.4			EOD2C02
57	nmr94eod	0.0	4	150.0	54.9	102.8			EOD2C03
58	nmr94eod	1.0	1	150.0	54.9	102.8	169.0	279.0	EOD2C03
59	nmr94eod	0.0	4	150.0	55.1	101.9			EOD2C04
60	nmr94eod	0.0	4	150.0	55.0	102.1			EOD2C05

61	nmr94eod	1.0	1	150.0	55.0	102.1	278.3	1215.3	EOD2C05
62	nmr94eod	0.0	5	150.0	55.0	131.7			EOD3C01
63	nmr94eod	0.0	5	150.0	55.0	131.3			EOD3C02
64	nmr94eod	0.0	5	150.0	55.0	132.7			EOD3C03
65	nmr94eod	0.0	5	150.0	55.0	131.8			EOD3C04
66	nmr94eod	0.0	5	150.0	55.0	132.2			EOD3C05
67	nmr94eod	0.0	5	150.0	54.9	131.7			EOD3C06
68	nmr94eod	0.0	5	150.0	54.9	131.6			EOD3C07
69	nmr94eod	0.0	5	150.0	54.9	131.3			EOD3C08
70	nmr94eod	0.0	5	150.0	55.0	132.1			EOD3C09
71	nmr94eod	0.0	5	150.0	55.0	131.8			EOD3C10
72	nmr94eod	0.0	5	150.0	54.9	132.0			EOD3C11
73	nmr94eod	0.0	5	150.0	55.0	133.2			EOD3C12
74	nmr94eod	0.0	5	170.0	39.9	90.9			EOD0D01
75	nmr94eod	0.0	5	170.0	40.0	90.6			EOD0D02
76	nmr94eod	0.0	5	170.0	39.9	91.2			EOD0D03
77	nmr94eod	0.0	5	170.0	39.9	91.3			EOD0D04
78	nmr94eod	0.0	5	170.0	40.0	90.6			EOD0D05
79	nmr94eod	0.0	4	170.0	39.9	92.4			EOD0D06
80	nmr94eod	1.0	1	170.0	39.9	92.4	253.6	1295.6	EOD0D06
81	nmr94eod	0.0	5	170.0	39.9	91.2			EOD0D07
82	nmr94eod	0.0	5	170.0	40.1	91.2			EOD0D08
83	nmr94eod	0.0	5	170.0	39.9	91.0			EOD0D09
84	nmr94eod	0.0	5	170.0	40.0	90.3			EOD0D10
85	nmr94eod	0.0	5	170.0	39.9	91.0			EOD0D11
86	nmr94eod	0.0	5	170.0	40.0	92.3			EOD0D12

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## **SECTION V: AIR & O<sub>2</sub> DECOMPRESSION**

### **B. DC8AOD**

- 256 dives: 3 DCS, 2 Marginal
  - All dives were dry
  - Dives were conducted from May 1979 through February 1987
  - Exercise: almost none
  - This data set is included in the report, Statistically Based Decompression Tables VII.
  - Descriptions of the DCS manifestations and dive descriptions were provided in references 1-3.
- 
1. Nishi RY, GR Lauckner, BC Eatock, JT Hewitt. Oxygen decompression techniques for compressed air diving using the XDC-2 decompression computer programmed with the Kidd-Stubbs 1971 model. DCOEM Report 84-R-19, June 1984.
  2. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F) DCIEM Report 84-R-72, Oct 1984.
  3. Lauckner GR, RY Nishi, BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series L-Q). DCIEM Report 85-R-18, April 1985.

## SECTION V: AIR & O<sub>2</sub> DECOMPRESSION

### B. DC8AOD 256 Dives: 3 DCS, 2 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	S/S
10	marginal	-7.5	2.5	intermittent at 18 msw, treatment started at 48 min
19	marginal	0	0	not treated, "no times available from <i>(initials deleted)</i> " marginal, not treated
37	DCS	119.5	179.5	Dry-resting subject <i>(initials deleted)</i> had mild Type I DCS following a dive to 36 msw for 50 min. In this case, also, no bubbles were detected in the precordial region. However, grade 2 bubbles were observed in the right shoulder from 70 min to 154 min following decompression. 3 hour post dive onset treatment started at 3 hr 20 min
57	DCS	121.0	420.0	Dry, resting subject <i>(initials deleted)</i> had Type II DCS after a dive to 45 msw for 40 min. Bubbles were detected from 63 min to 213 min following the start of decompression, with a peak score in the precordial site of 2/3. He reported knee pain, headache and vision problems. 7 hour post dive onset
62	DCS	29.7	89.7	Subject 0119 was a dry, resting subject for a 45 msw/40 min dive. He reported pain in his upper left arm 1.5 hrs post-dive. His Doppler score was 0/0 at this time and the pain disappeared prior to recompression. He was, however, treated on Table 5 and the "pain" re-appeared on descent. He was again totally asymptomatic on reaching 60 fsw. <i>(sic -- "msw" vs. "fsw")</i>



Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC8AOD	0.0	5	200.0	28.0	75.2			DR0395A 1 REPETS=1
2	DC8AOD	0.0	3	184.0	29.0	68.0			DR0396A 6 REPETS=1
3	DC8AOD	0.0	3	180.0	29.0	62.2			DR0434A 9 REPETS=1
4	DC8AOD	0.0	4	180.0	39.0	82.5			DR0435A 12 REPETS=1
5	DC8AOD	0.0	5	180.0	30.0	61.8			DR0436A 16 REPETS=1
6	DC8AOD	0.0	7	180.0	33.0	72.9			DR0440A 21 REPETS=1
7	DC8AOD	0.0	5	180.0	33.0	72.9			DR0441A 28 REPETS=1
8	DC8AOD	0.0	4	180.0	32.0	81.9			DR0445A 33 REPETS=1
9	DC8AOD	0.0	6	180.0	39.0	82.0			DR0447A 37 REPETS=1
10	DC8AOD	0.5	1	180.0	38.0	7.5	38.0	48.0	DR0448A 43 REPETS=1
11	DC8AOD	0.0	5	180.0	38.0	82.9			DR0448A 44 REPETS=1
12	DC8AOD	0.0	6	180.0	39.0	82.1			DR0450A 49 REPETS=1
13	DC8AOD	0.0	6	180.0	33.0	82.0			DR0451A 55 REPETS=1
14	DC8AOD	0.0	10	180.0	32.0	82.1			DR0455A 61 REPETS=1
15	DC8AOD	0.0	10	180.0	30.0	82.1			DR0458A 71 REPETS=1
16	DC8AOD	0.0	5	177.0	14.0	22.1			DR0523A 81 REPETS=1
17	DC8AOD	0.0	4	240.0	24.0	113.1			DR0526A 86 REPETS=1
18	DC8AOD	0.0	3	297.0	19.0	128.8			DR0532A 90 REPETS=1
19	DC8AOD	0.5	1	297.0	19.0	128.8	0.0	0.0	DR0532A 90 REPETS=1
20	DC8AOD	0.0	4	240.0	19.0	133.5			DR0534A 94 REPETS=1
21	DC8AOD	0.0	4	300.0	19.0	127.9			DR0535A 98 REPETS=1
22	DC8AOD	0.0	5	180.0	17.0	35.2			DR0540A 102 REPETS=1
23	DC8AOD	0.0	4	300.0	19.0	129.2			DR0545A 107 REPETS=1
24	DC8AOD	0.0	4	240.0	16.5	137.3			DR0546A 111 REPETS=1
25	DC8AOD	0.0	3	240.0	25.6	107.0			DR0547A 115 REPETS=1
26	DC8AOD	0.0	4	300.0	19.0	128.9			DR0549A 118 REPETS=1
27	DC8AOD	0.0	4	300.0	16.0	129.3			DR0554A 122 REPETS=1

28	DC8AOD	0.0	4	240.0	14.5	118.0	DR0555A	126 REPETS=1
29	DC8AOD	0.0	4	300.0	16.0	129.3	DR0556A	130 REPETS=1
30	DC8AOD	0.0	2	240.0	23.5	107.3	DR0558A	134 REPETS=1
31	DC8AOD	0.0	4	119.0	2.3	106.0	DR0018A	136 REPETS=1
32	DC8AOD	0.0	1	89.0	22.0	27.0	DR0170A	140 REPETS=1
33	DC8AOD	0.0	1	118.0	50.0	41.9	DR0171A	141 REPETS=1
34	DC8AOD	0.0	1	89.0	60.0	26.9	DR0172A	142 REPETS=1
35	DC8AOD	0.0	1	148.0	40.0	52.7	DR0184A	143 REPETS=1
36	DC8AOD	0.0	1	98.0	60.0	35.3	DR0186A	144 REPETS=1
37	DC8AOD	1.0	1	118.0	50.0	41.5	DR0187A	145 REPETS=1
38	DC8AOD	0.0	1	148.0	40.0	52.7	DR0189A	146 REPETS=1
39	DC8AOD	0.0	2	177.0	30.0	54.7	DR0190A	147 REPETS=1
40	DC8AOD	0.0	1	177.0	30.0	54.1	DR0192A	149 REPETS=1
41	DC8AOD	0.0	1	89.0	60.0	26.6	DR0193A	150 REPETS=1
42	DC8AOD	0.0	3	89.0	60.0	28.4	DR0219A	151 REPETS=1
43	DC8AOD	0.0	3	118.0	50.0	43.0	DR0220A	154 REPETS=1
44	DC8AOD	0.0	2	148.0	40.0	54.0	DR0221A	157 REPETS=1
45	DC8AOD	0.0	2	177.0	30.0	55.6	DR0222A	159 REPETS=1
46	DC8AOD	0.0	2	89.0	60.0	29.1	DR0223A	161 REPETS=1
47	DC8AOD	0.0	2	118.0	50.0	42.7	DR0224A	163 REPETS=1
48	DC8AOD	0.0	3	148.0	40.0	54.9	DR0225A	165 REPETS=1
49	DC8AOD	0.0	3	177.0	30.0	55.6	DR0226A	168 REPETS=1
50	DC8AOD	0.0	4	118.0	50.0	42.0	DR0237A	171 REPETS=1
51	DC8AOD	0.0	3	89.0	60.0	28.3	DR0238A	175 REPETS=1
52	DC8AOD	0.0	4	177.0	30.0	50.3	DR0239A	178 REPETS=1
53	DC8AOD	0.0	4	148.0	40.0	53.3	DR0240A	182 REPETS=1
54	DC8AOD	0.0	3	118.0	50.0	43.2	DR0241A	186 REPETS=1
55	DC8AOD	0.0	3	89.0	60.0	28.3	DR0242A	189 REPETS=1
56	DC8AOD	0.0	4	177.0	30.0	56.2	DR0243A	192 REPETS=1
57	DC8AOD	1.0	1	148.0	40.0	52.0	DR0244A	196 REPETS=1
58	DC8AOD	0.0	3	148.0	40.0	52.0	DR0244A	197 REPETS=1
59	DC8AOD	0.0	2	148.0	30.0	40.0	DR0304A	200 REPETS=1
60	DC8AOD	0.0	1	148.0	30.0	38.1	DR0306A	202 REPETS=1

61	DC8AOD	0.0	7	118.0	50.0	43.7			DR0345A	203	REPETS=1
62	DC8AOD	1.0	1	148.0	40.0	52.3	122.0	182.0	DR0346A	210	REPETS=1
63	DC8AOD	0.0	9	148.0	40.0	52.3			DR0346A	211	REPETS=1
64	DC8AOD	0.0	10	59.0	80.0	8.2			DR0363A	220	REPETS=1
65	DC8AOD	0.0	10	79.0	34.0	8.6			DR0369A	230	REPETS=1
66	DC8AOD	0.0	11	98.0	21.0	9.2			DR0370A	240	REPETS=1
67	DC8AOD	0.0	6	180.0	19.0	35.5			DR0541A	251	REPETS=1

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## **SECTION V: AIR & O<sub>2</sub> DECOMPRESSION**

### **C. DC8AOW**

- 46 dives: 3 DCS, 1 Marginal
  - All dives were wet; water temperature not available
  - Dives were conducted from 1982 through 1985
  - Exercise: most dives involved moderate exercise
  - This data set is included in the report, Statistically Based Decompression Tables VII.
  - Descriptions of the DCS manifestations and dive descriptions were provided in references 1-3.
- 
1. Nishi RY, GR Lauckner, BC Eatock, JT Hewitt. Oxygen decompression techniques for compressed air diving using the XDC-2 decompression computer programmed with the Kidd-Stubbs 1971 model. DCIEM Report 84-R-19, June 1984.
  2. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series G-K) DCIEM Report 84-R-73, November 1984.
  3. Lauckner GR, RY Nishi, BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series L-Q). DCIEM Report 85-R-18, April 1985.

## SECTION V: AIR & O<sub>2</sub> DECOMPRESSION

C. DC8AOW 46 Dives: 3 DCS, 1 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	S/S
5	DCS	30.3	142.3	Subject ( <i>initials deleted</i> ) experienced mild Type II DCS (numbness in his left hand, pain from the left elbow to the shoulder) after a dive to 45 msw for 40 min as the wet, working diver. No bubbles were detected in the precordial region and only a few bubbles were detected in his left shoulder at 131 min following the start of decompression. Treatment commenced at 195 min.
27	Marginal	30	60	Subject #0118 was a wet, working diver for a 45 msw/40 min dive. One hour post-dive, he reported a slight pain in both elbows. His Doppler score was minimal at this time. Although the pain disappeared prior to recompression, the subject was treated on a Table 5. He remained asymptomatic through the treatment. Later investigation showed that the subject was wet and cold (both arms to elbows) during the dive.
28	DCS	-2.1	10	Subject #0117 was a wet, working subject for a 45 msw/40 min dive. He reported a slight pain in his right elbow 10 min post-dive. His Doppler score (right shoulder) was 2/3 at that time. Subject reported cold discomfort during dive and further investigation revealed he had virtually no food for two days prior to the dive.
31	DCS	-2.2	15	Subject ( <i>initials deleted</i> ) was the wet, swimming diver for the repetitive dive combination (45 msw/30 min plus 45 msw/20 min with a 2 hr surface interval). Fifteen minutes after surfacing from the first dive, diver reported pain in his right shoulder. His Doppler score was 2/2 in the right shoulder as well as in the precordial region. He was treated for Type I DCS on Table 5 and had complete relief on descent at 22 fsw ( <i>sic. treatment depth was measured in "fsw" with the dives measured in "msw"</i> )

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC8AOW	0.0	2	121.0	2.3	106.0			DR0018A 1 REPETS=1
2	DC8AOW	0.0	1	90.0	22.0	27.0			DR0170A 3 REPETS=1
3	DC8AOW	0.0	1	120.0	50.0	41.9			DR0171A 4 REPETS=1
4	DC8AOW	0.0	1	90.0	60.0	26.9			DR0172A 5 REPETS=1
5	DC8AOW	1.0	1	150.0	40.0	52.7	123.0	235.0	DR0184A 6 REPETS=1
6	DC8AOW	0.0	1	100.0	60.0	35.3			DR0186A 7 REPETS=1
7	DC8AOW	0.0	1	120.0	50.0	41.5			DR0187A 8 REPETS=1
8	DC8AOW	0.0	1	150.0	40.0	52.7			DR0189A 9 REPETS=1
9	DC8AOW	0.0	1	180.0	30.0	54.7			DR0190A 10 REPETS=1
10	DC8AOW	0.0	1	180.0	30.0	54.1			DR0192A 11 REPETS=1
11	DC8AOW	0.0	1	90.0	60.0	26.6			DR0193A 12 REPETS=1
12	DC8AOW	0.0	1	90.0	60.0	28.4			DR0219A 13 REPETS=1
13	DC8AOW	0.0	2	120.0	50.0	43.0			DR0220A 14 REPETS=1
14	DC8AOW	0.0	1	150.0	40.0	54.0			DR0221A 16 REPETS=1
15	DC8AOW	0.0	2	180.0	30.0	55.6			DR0222A 17 REPETS=1
16	DC8AOW	0.0	2	90.0	60.0	29.1			DR0223A 19 REPETS=1
17	DC8AOW	0.0	2	120.0	50.0	42.7			DR0224A 21 REPETS=1
18	DC8AOW	0.0	1	180.0	30.0	55.6			DR0226A 23 REPETS=1
19	DC8AOW	0.0	2	120.0	50.0	42.0			DR0237A 24 REPETS=1
20	DC8AOW	0.0	2	90.0	60.0	28.3			DR0238A 26 REPETS=1
21	DC8AOW	0.0	2	180.0	30.0	50.3			DR0239A 28 REPETS=1
22	DC8AOW	0.0	2	150.0	40.0	53.3			DR0240A 30 REPETS=1
23	DC8AOW	0.0	2	120.0	50.0	43.2			DR0241A 32 REPETS=1
24	DC8AOW	0.0	2	90.0	60.0	28.3			DR0242A 34 REPETS=1
25	DC8AOW	0.0	2	180.0	30.0	56.2			DR0243A 36 REPETS=1
26	DC8AOW	0.0	2	150.0	40.0	52.0			DR0244A 38 REPETS=1
27	DC8AOW	0.5	1	150.0	40.0	52.3	122.0	152.0	DR0346A 40 REPETS=1
28	DC8AOW	1.0	1	150.0	40.0	52.3	90.2	102.3	DR0346A 41 REPETS=1
29	DC8AOW	0.0	2	150.0	30.0	40.0			DR0304A 42 REPETS=1
30	DC8AOW	0.0	2	150.0	30.0	38.1			DR0306A 44 REPETS=1
31	DC8AOW	1.0	1	147.6	208.0	34.0	65.5	82.7	DR0322R





## SECTION VI: SATURATION

### A. ASATARE

- 165 dives: 20 DCS, 13 Marginal
- All dives were dry; no excursions
- Dives were conducted from 1984 through 1986
- Exercise: none
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations and dive descriptions were provided in references 1-4. Additional descriptions were compiled from hand-written notes based on additional information provided by CDR Dave Smith, MC, USN (during his time spent at the Institute of Naval Medicine in Alverstoke)

1. Bell PY, DW Burgess, TR Hennessy, TG Shields, M. Summerfield. Rescue under pressure. An investigation into the maximum safe decompression step to a holding pressure of 2 bar. Report ARE(M) R84004, June 1984.
2. Bell PY, MS English, DJ Harris, G Nichols, Z Torok, JR Harrison, KT Page, MA McLeod. Islander 1. An investigation of direct decompression from oxygen/nitrogen saturation to 1 bar. Report ARE(ESD) R88703, October 1988.
3. Bell PY, JR Harrison, K Page, M Summerfield. An effect of CO<sub>2</sub> on the maximum safe direct decompression to 1 bar from oxygen-nitrogen saturation. Undersea Biomedical Research 13:443-455, 1986.
4. Bell PY. Studies of decompression from oxygen/nitrogen saturation (Islander2). A preliminary report. Report ARE TM (ASP) 86603, June 1986.

## SECTION VI: SATURATION

### A. ASATARE

165 Dives: 20 DCS, 13 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
4	DCS	-1700	-1433	<i>Hand notes:</i> Left leg stiffness reported 3 hr 3 min after leave bottom 32.8 msw (3067.), pressed to 18 m @ 3096.00, divers on bibs. Modified RN 62 - 1 hr extra at 9 m O <sub>2</sub> 1835. <i>other notes:</i> MSZ - 1207 - stiff left leg (2 bar); 1236 - compress 18 m on O <sub>2</sub>
5	DCS	-1700	-1045	<i>Hand notes:</i> At 1 m second diver pain right knee - compress to 9 m on O <sub>2</sub> all divers - (1 hr on O <sub>2</sub> 9m) dive completed in accordance with protocol. <i>Other notes:</i> SH - 1835 @ 1 m pain right knee (1.1 bar) compressed to 9 m on O <sub>2</sub> 1 hr on O <sub>2</sub> @ 9 m, dive completed in accordance with protocol
7	DCS	-1625	70	<i>Hand notes:</i> Surfaced (1205) or (1207) at 0.00 m 1315 right knee pain 1350 commenced RN61; 1351 relieved
10	DCS	-1455	-953	<i>Hand notes:</i> 02 Jul 81 3382 - 1722 - sensitive feeling right knee 3503 - start press to 30 msw 3512 - arrive 30 m 3540 pt well - no discomfort 18 m 3543 - 18 m 3685 - 9 m
12	Marginal	-1625	150	<i>Hand notes:</i> Right knee pain, nigggle 1205 on surface - discrepancy with 30 min O <sub>2</sub> should be 1228 (4478) 1445 - right knee pain - O <sub>2</sub> @ surface X 1 hr 15 min <i>other notes:</i> 1205 on surface 1445 slight pain in right knee - O <sub>2</sub> @ surface X 1 hr 15 min
16	DCS	-1.4	388.6	<i>from Report:</i> Having spent 48 hours at 1.8 bar, 4.5 hours after direct decompression lasting less than one minute to 1 bar, this subject reported a slight ache in his left knee. He did this by way of observation rather than complaint. A 1/2 later the ache dispersed spontaneously, radiating up and down along the medial aspect of his leg muscles. 6.5 hours after the decompression step a similar slight ache started in the opposite knee which was not reported for 2 hours, during which interval it increased in severity to be comparable to bad toothache. It was treated on RN Table 61, resolving completely within 20 minutes. from table in report pg 8.2: left knee pain first noticed 4 hr 25 min & reported 8 hr 5 min; right knee pain first noticed 6 hr 25 min; Recompression started 8 hr 25 min; Pain resolved < 20 min from <i>Hand notes:</i> DCS left knee noticed 4:25 after decompression, reported 8:05, RN 61 8:25; right knee noticed 6:25 after decompression

17	Marginal	-1.4	1079	from <i>Hand notes</i> : Niggles, 2 cases at 1 ATA (1/26/84) reported 18 hr after decompression, resolved post dive 1/28/84 from table in report pg 8.3: two subjects: muscle ache on rising in the morning "as if kicked all over the body." from <i>Hand notes</i> : Niggles, 2 cases at 1 ATA (1/26/84) reported 18 hr after decompression, resolved post dive 1/28/84 from table in report pg 8.3: two subjects: muscle ache on rising in the morning "as if kicked all over the body." from <i>Report</i> : The subject was prepared for recording his H-reflexes and 10 minutes before the decompression step from 1.8 bar to 1.0 bar was done, his right trouser leg was rolled up and metal electrodes were applied behind his knee, and held with a rubber band. The assembly remained in place for less than 30 minutes. A slight throbbing ache in that knee started 8 minutes after the decompression step, and remained unreported for 3 hours. Another 3.5 hours later the intensity of this ache increased, and was treated according to RN Table 61. It disappeared completely in 7 minutes on recompression to 2.8 bar. from table in report pg 8.2: right knee pain first noticed 8-10 min; pain reported 3 hr 5 min; Recompression started 6 hr; Pain resolved 7 min from <i>Hand notes</i> : DCS right knee, noticed 8 min after decompression to 0.00 msw - reported 3 hrs later - RN 61 - resolved in 7 min @ 2.86
23	Marginal	-2.0	516	from <i>Hand notes</i> : pins & needles after decompression (8 hr 36 mins) 3393.00, resolved (3 min) @ 3396.00 Ache in hamstring bruise of recent sports injury from table in report pg 8.3: Dive #7, saturation pressure 1.7 bar, pCO <sub>2</sub> 0.02 bar, ache in large bruise of recent sports injury.
27	DCS	-3.0	377	from <i>Report</i> : This subject was exposed to 1.8 bar for 48 hours in an atmosphere containing 0.4 bar oxygen, 0.02 bar carbon dioxide, remainder nitrogen. Four [this was crossed out and "2" was written in] hours after decompression to 1.0 bar during the ultrasonic experiment, on flexing his knees he noted a slight dull ache behind his right knee, which he reported after a further 2.25 hours delay. He was recompressed 8 hours after the decompression drop. The RN Table 61 was used with complete symptomatic relief within 5 minutes at 2.8 bar on oxygen. from table in report pg 8.2: right knee pain first noticed 2 hr [4 hr?]; pain reported 6 hr 15 min; Recompression started 8 hr; Pain resolved 5 min from <i>Hand notes</i> : DCS left knee, info in UBR is confusing on 8.2. Pain 1st noticed 2 hr after decompression to 0.0, reported after a 2.25 hr delay or after a 4 hr 15 min delay. RN 61 started 8 hr post decompression. Relief after 5 min.
28	Marginal	-3.0	377	from <i>Hand notes</i> : Muscular ache - mastoid process (1-2 hrs) (3260.00) from table in report pg 8.3: Muscular ache near mastoid process, lasting 1 to 2 hours.
30	DCS	-2.0	223	from <i>Report</i> : The exposure was the usual 48 hours at 1.8 bar; the breathing gas in this case contained 0.4 bar oxygen, 0.02 bar carbon dioxide, remainder nitrogen. 3.75 hours after the decompression drop this subject noted, but did not report, a slight ache in his left patella during the ultrasonic experiment. 1.25 hours later the pain increased, radiating for the first time to the quadriceps muscle. Neurological examination revealed very brisk myotatic reflexes with extended trigger areas, equal in both legs, but no clonus or other signs of spasticity. The plantar reflexes remained flexor, with all other signs normal. The above ache was completely relieved within 3 minutes on RN Table 61. All signs on neurological examination were normal at the end of therapy. from table pg 8.2: left knee pain first noticed 3 hr 45 min, reported 4 hr 35 min, Recompression started 5 hr 28

30 (cont)					min, Pain resolved 3 min from Hand notes: DCS pain noticed 3:45 (3285.00) after decompression, pain reported (4:35), RN 61 started 5:28. Discrepancy in UBR as to time of events pg 8.2
34	DCS	-1336	-143		Sx first appeared at 1.1 bar; Type I. Both knees Hand notes: 11/23/86 1000 hrs - pain behind knees noticed; 1100 - pain both knees reported 1153 (dl) 054 msw 1.1 bar RN 62 - after evaluation at .5 msw with complete resolution
36	DCS	-2645	-2523		Sx first appeared at 2 hr at 2 bar Type I. Right knee From Hand notes: 2898.00, 54.00 RN62 partial, 18 meters complete relief 29.25 pain reoccurred 23.10 pain worse 29.25 some relief 4339.00, 32.50 joined group Another set of Hand notes: 1/28/86 1757 hrs - Type I (partial RN62) (time?) - relief @ 18 m - 9 m residual ache (returned) - 7.1 m pain worse - recompress to 9 m w/some relief - not complete - pressed to 10 m & rejoin group off/on O <sub>2</sub> during regular decompression. - initially symptom free- but dull ache continued thru decompression
37	Marginal	-2645	-1680		Fatigue
37	Marginal	-2645	-1680		Fatigue
37	Marginal	-2645	-1680		Fatigue
37	Marginal	-2645	-1680		Fatigue
38	DCS	-2645	288		Sx first appeared at 1 hr at 1 bar Type II. Both arms and left leg sensor-motor From Hand notes: 2919.5, 32.50 ~ DCS hit RN62 Other Hand notes: 2/4 - 17 30 hrs (dl) - aware right knee X 1 hr at 1 m depth w/tingling both legs - No Tx. - 0825 - 2 m - feels achy all over (2/5? 2/6?) 1048 - numbness both hands and right thigh - RN 62 - 2 additional 9 m "soaks" reports well "Blue book - 1 hr @ 1 bar - symp 1st appeared. both arms L. leg."

40	Marginal	-3005	-1983	<p>left hand; <i>Hand notes:</i> 2/11/86 - 0857 (dl)</p> <ul style="list-style-type: none"> <li>- joints of left hand hurt twitches every now and then, resolved over 30 min</li> <li>0946 (dl) ache now gone (reported)</li> <li>0924 - numbness right knee (dl)</li> <li>2017 - in hands and legs pins &amp; needles</li> <li>2/13/86 - 1720 (dl) at .33 m ache right shoulder resolved by next AM 0700</li> </ul> <p>Twitches, numbness right knee, pins &amp; needles</p>
41	Marginal	-1200	-15	
43	DCS	-2645	-2535	<p>Sx first appeared at 1 hr at 2 bar</p> <p>Type I. Right knee</p> <p>from <i>Hand notes:</i> ~ 1730-1735 - right knee pain noticed</p> <p>2/18 - 1745 (dl) - reported right knee pain</p> <ul style="list-style-type: none"> <li>- RN62 X 1 extension due to reoccurrence at 3.5 m during Tx Table. Compressed to 6 m with relief, brought out to surface</li> <li>- pain reoccurred with additional ankle pain 30 min after surfacing</li> <li>- 2nd RN 62 completed but modified with rejoin group @ 10 m.</li> </ul>
46	DCS	-1200	-178	<p>Sx first appeared --&gt; report says: "22.5 hr at 2 bar" crossed out and PKW notes "at 1.5 m" Type I. left knee</p> <p><i>Hand notes</i> on treatment: 3/6 - 0902 (dL) - at 1.5 m - left knee pain</p> <ul style="list-style-type: none"> <li>- RN 62. Relief after 21 min DCS (Type I)</li> </ul>
47	DCS	-1200	288	<p>Sx first appeared --&gt; report says: "29.5 hr at 1 bar"; PKW notes: "5 h"</p> <p>Type II. Sensory both legs</p> <p><i>Hand notes</i> on treatment: 3/6 - 1658 (dl) - Right knee stiffness posterior;</p> <p>1730 (ml) - paraesthesia both legs - improved with movement. OK in AM</p> <p>3/7 - 1200 - beginning approximately - recurrence of paresthesias until was reported at 1700 (ml).</p> <p>1820 - (ml) treated RN 62 with complete relief</p> <p>3/14 - 1300 (ml) - reported paresthesia and woody feeling left leg - rx'd w/O<sub>2</sub> 9 m - 1 hr good response</p> <p>[Re: profiles #46 &amp; #47, notes on printout indicate Type I and Type II (2 cases total) one after surfacing.]</p>
49	DCS	-2645	-2430	<p>Sx first appeared 4.5 hr at 2 bar; Type II. Both knees and left eye</p> <p><i>Hand notes:</i> 3/11- 2113 (dl) - pt cannot continue w/ultrasonic exercise due to pain both knees, 1930 (ml) knee pain</p> <p>3/11 - 2113 (ml) knee pain and slight blurred vision RN62 all symptoms gone within 20 minutes. Rejoined at 10 m group. Completed remainder of O<sub>2</sub> at 10 m. Recurrence later requiring 9 m soak.</p>
50	Marginal	-2645	-2585	<p>Sx first appeared at 1 hr at 2 bar; knee</p> <p><i>Hand notes:</i> (?date) - follow-up after dive, one subject reports niggles in both knees "not in doubt"; noticed first 3/11 ~ 1 hr after move to 10 m, lasted rest of day.</p>
52	DCS	-2645	-2617	<p>Sx first appeared at 23 hr at 2 bar, No Tx. Type II. right forearm, left fingers</p> <p>3/19 - 1254 (dl) - ache right forearm X 16 min, then X5 min - progressed to paraesthesias tips of fingers and left arm feels heavy - evaluated - not treated after exam (sym last X 25 min) 1310 (dl) - gone 1344 (dl) - returns 1349 (dl) - gone; 1406 (dl) - tingling left finger; 1415 - tingling in left finger tips and left arm feels heavy; 1455 - intermittent pains in left forearm "no Rx"</p>

53	DCS	-2645	-1265	<p>Sx first appeared at 0.5 hr at 2 bar. Type I. left shoulder</p> <p><i>Hand notes:</i> 3/18 - 1616 (dl) - left arm feels "as if lifting weights since 1610"</p> <p>1623 - (dl) - 23 min after move, pt noted, left arm feels same. Throbbing left shoulder pain</p> <p>- modified RN 62 - w/ O<sub>2</sub> stops completed at 10 m</p> <p>1642 (dl) - tingling numbness right hand X 5 min</p>
57	DCS	-2645	-2266	<p>Sx first appeared at 6 hr at 2 bar</p> <p>Type I. left shoulder</p> <p><i>Hand notes:</i> 4/29/84 - 2214 (dl) - slight ache in left shoulder that comes and goes modified RN 62 - complete relief after 45 min into Tx. Rejoined at 10 m after O<sub>2</sub>.</p> <p>4/30/86 - 1600 (dl) - itching on chest, back &amp; left hand (occasionally feet) elevated. No Tx. Apparently reported in diver sick call 4/29 PM.</p> <p>5/1/86 - 2156 (dl) 2201 (ml) pain in finger right hand - resolved w/o Tx after 8.5 hrs.</p> <p>6(5?)/1 - 0710 (dl) reported as no longer present</p>
58	Marginal	-1200	596	<p>Sx first appeared at Surf + 10 hr</p> <p>right hand</p>
60	DCS	-1200	2550	<p>Sx first appeared at 42.5 hr at 1 bar. Type I. left shoulder (approx. 1.5 days post surface)</p> <p><i>Hand notes:</i> DCS after day 6 post surface</p> <p>surfaced 5/15/86 1200</p> <p>Lv 10 m 5/14/86 1600</p>
64	DCS	-1200	-240	<p>Sx first appeared at 1.2 bar. Type I. Right shoulder</p> <p><i>Hand notes:</i> 6/12/86 - 1016 (dl) - slight twinge in right shoulder since getting up, but no worse.</p> <p>1051 (ml) - Type I - right shoulder pain on ascent - noticed since waking</p> <p>+1 - 0800 - (2 meters)</p> <p>TT - immediate relief</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	ASATARE	0.0	3	65.3	2880.0	1625.0			RESCUE 1
2	ASATARE	0.0	3	71.8	2880.0	1625.0			RESCUE 2
3	ASATARE	0.0	1	78.3	2880.0	1620.0			RESCUE 3
4	ASATARE	1.0	1	78.3	2880.0	1620.0	2880.0	4575.0	RESCUE 3
5	ASATARE	1.0	1	78.3	2880.0	1620.0	2880.0	3455.0	RESCUE 3
6	ASATARE	0.0	2	75.1	2875.0	1625.0			RESCUE 4
7	ASATARE	1.0	1	75.1	2880.0	1625.0	2880.0	4575.0	RESCUE 4
8	ASATARE	0.0	3	75.1	2880.0	1625.0			RESCUE 5
9	ASATARE	0.0	2	75.1	2879.0	1455.0			RESCUE 6
10	ASATARE	1.0	1	75.1	2879.0	1455.0	2880.0	3382.0	RESCUE 6
11	ASATARE	0.0	2	75.1	2850.0	1625.0			RESCUE 7
12	ASATARE	0.5	1	75.1	2850.0	1625.0	2880.0	4655.0	RESCUE 7
13	ASATARE	0.0	5	23.5	2880.0	1.8			ISLANDER I dive 1
14	ASATARE	0.0	5	22.8	2880.0	2.0			ISLANDER I dive 2
15	ASATARE	0.0	2	26.1	2880.0	1.4			ISLANDER I dive 3
16	ASATARE	1.0	1	26.1	2880.0	1.4	2880.0	3270.0	ISLANDER I dive 3
17	ASATARE	0.5	2	26.1	2880.0	1.4	2880.0	3960.0	ISLANDER I dive 3
18	ASATARE	0.0	4	26.1	2880.0	2.0			ISLANDER I dive 4
19	ASATARE	1.0	1	26.1	2880.0	2.0	2880.0	3065.0	ISLANDER I dive 4
20	ASATARE	0.0	5	22.8	2880.0	2.0			ISLANDER I dive 5
21	ASATARE	0.0	5	22.8	2879.0	6.0			ISLANDER I dive 6
22	ASATARE	0.0	4	22.8	2875.0	2.0			ISLANDER I dive 7(.02b CO2)
23	ASATARE	0.5	1	22.8	2875.0	2.0	2880.0	3398.0	ISLANDER I dive 7(.02b CO2)
24	ASATARE	0.0	5	22.8	2880.0	3.0			ISLANDER I dive 8(.02b CO2)
25	ASATARE	0.0	5	26.1	2882.0	5.0			ISLANDER I dive 9(.02b CO2)
26	ASATARE	0.0	3	26.1	2880.0	3.0			ISLANDER I dive 10(.02b CO2)
27	ASATARE	1.0	1	26.1	2880.0	3.0	2880.0	3260.0	ISLANDER I dive 10(.02b CO2)
28	ASATARE	0.5	1	26.1	2880.0	3.0	2880.0	3260.0	ISLANDER I dive 10(.02b CO2)
29	ASATARE	0.0	4	26.1	2880.0	2.0			ISLANDER I dive 11(.02b CO2)
30	ASATARE	1.0	1	26.1	2880.0	2.0	2880.0	3105.0	ISLANDER I dive 12(.02b CO2)

31	ASATARE	0.0	5	22.8	2862.0	4.0	ISLANDER I dive12(.02b CO2)
32	ASATARE	0.0	5	22.8	2880.0	2.0	ISLANDER I dive13(.02b CO2)
33	ASATARE	0.0	4	71.8	2891.0	2781.0	ISLANDER II dive1
34	ASATARE	1.0	1	71.8	2891.0	2781.0	ISLANDER II dive1
35	ASATARE	0.0	4	71.8	2894.0	2645.0	ISLANDER II dive2
36	ASATARE	1.0	1	71.8	2894.0	2645.0	ISLANDER II dive2
37	ASATARE	0.5	4	71.8	2888.0	2645.0	ISLANDER II dive3
38	ASATARE	1.0	1	71.8	2888.0	2645.0	ISLANDER II dive3
39	ASATARE	0.0	3	71.8	2891.0	3005.0	ISLANDER II dive4
40	ASATARE	0.5	1	71.8	2891.0	3005.0	ISLANDER II dive4
41	ASATARE	0.5	1	71.8	2891.0	3005.0	ISLANDER II dive4
42	ASATARE	0.0	4	71.8	2892.0	2645.0	ISLANDER II dive5(.02b CO2)
43	ASATARE	1.0	1	71.8	2892.0	2645.0	ISLANDER II dive5(.02b CO2)
44	ASATARE	0.0	5	71.8	2889.0	2645.0	ISLANDER II dive6(.02b CO2)
45	ASATARE	0.0	3	71.8	2892.0	2645.0	ISLANDER II dive7(.02b CO2)
46	ASATARE	1.0	1	71.8	2892.0	2645.0	ISLANDER II dive7(.02b CO2)
47	ASATARE	1.0	1	71.8	2892.0	2645.0	ISLANDER II dive7(.02b CO2)
48	ASATARE	0.0	3	68.5	2891.0	2645.0	ISLANDER II dive8(.02b CO2)
49	ASATARE	1.0	1	68.5	2891.0	2645.0	ISLANDER II dive8(.02b CO2)
50	ASATARE	0.5	1	68.5	2891.0	2645.0	ISLANDER II dive8(.02b CO2)
51	ASATARE	0.0	2	65.3	2895.0	2645.0	ISLANDER II dive9(.02b CO2)
52	ASATARE	1.0	1	65.3	2895.0	2645.0	ISLANDER II dive9(.02b CO2)
53	ASATARE	1.0	1	65.3	2895.0	2645.0	ISLANDER II dive9(.02b CO2)
54	ASATARE	0.0	5	65.3	2892.0	2645.0	ISLANDER II dive10(.02b CO2)
55	ASATARE	0.0	5	65.3	2890.0	2645.0	ISLANDER II dive11(.02b CO2)
56	ASATARE	0.0	3	65.3	2890.0	2645.0	ISLANDER II dive12(.02b CO2)
57	ASATARE	1.0	1	65.3	2890.0	2645.0	ISLANDER II dive12(.02b CO2)
58	ASATARE	0.5	1	65.3	2890.0	2645.0	ISLANDER II dive12(.02b CO2)
59	ASATARE	0.0	4	62.0	2891.0	2645.0	ISLANDER II dive13(.02b CO2)
60	ASATARE	1.0	1	62.0	2891.0	2645.0	ISLANDER II dive13(.02b CO2)
61	ASATARE	0.0	5	62.0	2873.0	2645.0	ISLANDER II dive14(.02b CO2)
62	ASATARE	0.0	5	62.0	2890.0	2645.0	ISLANDER II dive15(.02b CO2)
63	ASATARE	0.0	4	62.0	2891.0	2645.0	ISLANDER II dive16(.02b CO2)
64	ASATARE	1.0	1	62.0	2891.0	2645.0	ISLANDER II dive16(.02b CO2)



## SECTION VI: SATURATION

### B. ASATNSM

- 132 dives: 18 DCS, 21 Marginal
- All dives were dry; excursions were also dry
- Dives were conducted over different periods:
  - Profiles 1-13 November 1983 - May 1984
  - Profiles 14-17 March 1977 - February 1979
  - Profiles 18-24 May 1979 - February 1981
  - Profiles 25-28 September 1982 - January 1984
  - Profiles 29-41 September 1984 - September 1986
  - Profiles 42-45 October 1986 - June 1987
- Exercise: none except for Profiles 14-17 with 30 minutes on a bicycle ergometer during excursions
- This data set is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the studies and DCS manifestations are provided in references 1-3. Additional manifestation information was obtained from dive logs, medical records and notes made by Paul K. Weathersby as provided in reference 4.

1. Eckenhoff, RG, SF Osborne, JW Parker, KR Bondi. Direct ascent from shallow air saturation exposures. Undersea Biomedical Research 13:305-316, 1986
2. Eckenhoff, RG and Vann RD. Air and nitrox saturation decompression: a report of 4 schedules and 77 subjects. Undersea Biomedical Research 12:41-52, 1985.
3. Parker, JW. Upward excursion limits from air saturation at 5 ATA. Naval Submarine Research Laboratory, Report #1127, January 1989.
4. Weathersby, PK, SS Survanshi, RY Nishi and ED Thalmann. Statistically Based Decompression Tables VII: Selection and Treatment of Primary Air and N<sub>2</sub>O<sub>2</sub> Data. Joint Technical Report: Naval Medical Research Institute Report #92-85, Naval Submarine Medical Research Laboratory Report #1182.

## SECTION VI: SATURATION

### B. ASATNSM 132 Dives: 18 DCS, 21 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
2	Marginal			descent to 25.5 FSW 1:23. 48.0 hr, ascent 1:25 One diver +12 hr slight pain and fatigue; 3 divers excess fatigue [total 4 fatigue]
2	Marginal			descent 2:00 to 25.5 FSW. 48.0 hr, ascent 1 min (medical log says 1:20), 3 divers fatigued [total 3 fatigue]
2	Marginal			descent 2:25 to 25.5 FSW. 48.0 hr, ascent 1:30, 5 divers fatigued [total 5 fatigue]
2	Marginal			descent 2 min to 25.5 FSW. 48.0 hr ascent 1:04, 1 diver fatigued [total 1 fatigue]
3	Marginal	119.7	719.7	descent to 25.5 FSW 1:23. 48.0 hr, ascent 1:25, +12 hrs one diver slight pain [total 1 niggles]
4	Marginal	10.7	29.7	descent 2 min to 25.5 FSW. 48.0 hr, ascent 1:04; +30 min one diver slight pain [total 1 niggles]
5	Marginal	119.7	298.7	descent 2 min to 25.5 FSW. 48.0 hr, ascent 1:04; +5 hrs slight pain (both divers?) [total 2 niggles]
7	DCS	29.6	64.6	descent 2 min to 29.5 FSW; 48.0 hr, ? ascent rate +65 min mild knee pain
8	DCS	29.6	79.6	descent 2 min to 29.5 FSW; 48.0 hr, ? ascent rate +80 min knee pain
9	DCS	29.6	89.6	descent 2 min to 29.5 FSW; 48.0 hr, ? ascent rate +90 min knee pain
10	DCS	29.6	149.6	descent 2 min to 29.5 FSW; 48.0 hr, ascent 1:25 +2.5 hrs ankle
11	Marginal	109.6	149.6	descent 2 min to 29.5 FSW; 48.0 hr, ascent 1:25 +2.5 hrs knee [total 1 niggles]
12	Marginal	119.6	359.6	descent 2 min to 29.5 FSW; 48.0 hr, ascent 1:25 +6 hrs knee stiffness [total 1 niggles]
13	Marginal			descent 2 min to 29.5 FSW; 48.0 hr, ascent 1:25 [total 1 fatigue]

15	DCS	-941.0	-221.0	Diver arrived surface pain both knees - complaint logged 0616, depth - 6 fsw
17	Marginal	-540.0	-180.0	Surface + 4 hrs diver reports "not normal" sensation in left knee. No other Sx. Will observe for progression. No other entries later. 1 "discomfort in left knee ~ 3 hr post surface" no Tx ---> outcome = 0.5
19	DCS	-842.7	-122.7	No notes on symptoms
22	DCS	-825.0	137.0	No notes on symptoms
23	DCS	-280.0	440.0	No notes on symptoms
26	DCS	-899.0	-179.0	0615 diver on waking "ache both knees, feels stiff"; 0710 "dull ache"; at 2 fsw definite pain; TX!
31	DCS	-3710.0	-3415.0	1855 'tight' right knee. On O <sub>2</sub> at 53 h 11 min. Stay at 60 fsw
33	DCS	-4069.0	-3349.0	0711 (5351) @ 26 ft, diver knee pain. Med log: shows no other problem, no indications of other Sx or O <sub>2</sub> treatment
34	DCS	-2.9	327.1	"all with symptoms" (no further description)
34	DCS	-2.9	327.1	"all with symptoms" (no further description)
34	DCS	-2.9	327.1	"all with symptoms" (no further description)
36	DCS	-2.0	127.0	Diver had mild discomfort in LT shoulder, mild generalized skin itching X 15 min after reaching 60 ft
36	DCS	-2.0	127.0	entry 3098 diver c/o LT knee discomfort X 40 min; entry 3214 c/o mild-moderate RT knee pain; entry 3218.78 Judge on O <sub>2</sub> .
37	DCS	-720.0	0	none described or indicated, only the note "diver 6528 T <sub>2</sub> then truncate"
40	DCS	-3054.0	-2334.8	No description of symptoms

\* In this dataset, all cases of DCS represent only one individual; the number of divers represented per profile number in the marginal cases are indicated in brackets.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	ASATNSM	0.0	2	25.5	2880.0	1.3			MINISAT-1
2	ASATNSM	0.5	13	25.5	2880.0	1.3	0.0	0.0	MINISAT-1 (fatigue)
3	ASATNSM	0.5	1	25.5	2880.0	1.3	3001.0	3601.0	MINISAT-1 (niggles)
4	ASATNSM	0.5	1	25.5	2880.0	1.3	2891.0	2911.0	MINISAT-1 (niggles)
5	ASATNSM	0.5	2	25.5	2880.0	1.3	3001.0	3180.0	MINISAT-1 (niggles)
6	ASATNSM	0.0	8	29.5	2880.0	1.4			MINISAT-2
7	ASATNSM	1.0	1	29.5	2880.0	1.4	2911.0	2946.0	MINISAT-2
8	ASATNSM	1.0	1	29.5	2880.0	1.4	2911.0	2961.0	MINISAT-2
9	ASATNSM	1.0	1	29.5	2880.0	1.4	2911.0	2971.0	MINISAT-2
10	ASATNSM	1.0	1	29.5	2880.0	1.4	2911.0	3031.0	MINISAT-2
11	ASATNSM	0.5	1	29.5	2880.0	1.4	2911.0	3031.0	MINISAT-2 (niggles)
12	ASATNSM	0.5	1	29.5	2880.0	1.4	3001.0	3241.0	MINISAT-2 (niggles)
13	ASATNSM	0.5	1	29.5	2880.0	1.4	0.0	0.0	MINISAT-2 (fatigue)
14	ASATNSM	0.0	10	60.0	10320.0	1200.0			AIRSAT-1+LAST EXCURS
15	ASATNSM	1.0	1	60.0	10320.0	1200.0	10579.0	11299.0	AIRSAT-1+LAST EXCURS
16	ASATNSM	0.0	11	60.0	11760.0	1200.0			AIRSAT-2 + LAST EXCURS
17	ASATNSM	0.5	1	60.0	11760.0	1200.0	12420.0	13140.0	AIRSAT-2 + LAST EXCURS
18	ASATNSM	0.0	3	132.0	7205.0	3094.0			AIRSAT-3A+last 198' excurs
19	ASATNSM	1.0	1	132.0	7203.0	3094.0	9455.0	10175.0	AIRSAT-3B+last 198' excurs
20	ASATNSM	0.0	2	132.0	7203.0	3094.0			AIRSAT-3B+last 198' excurs
21	ASATNSM	0.0	3	132.0	7204.0	3094.2			AIRSAT-3C+ last 198' excurs
22	ASATNSM	1.0	1	132.0	6944.0	3094.0	9213.0	9933.0	AIRSAT-3D + last 198' excur
23	ASATNSM	1.0	1	132.0	6944.0	3094.0	9758.0	10478.0	AIRSAT-3D + last 198' excur
24	ASATNSM	0.0	1	132.0	6944.0	3094.0			AIRSAT-3D + last 198' excur
25	ASATNSM	0.0	11	132.0	3600.0	3908.0			AIRSAT4A-D,
26	ASATNSM	1.0	1	132.0	3600.0	3908.0	6609.0	7329.0	AIRSAT4-D,
27	ASATNSM	0.0	3	132.0	3600.0	3908.0			AIRSAT4E,
28	ASATNSM	0.0	3	132.0	3600.3	3907.7			AIRSAT4F,

29	ASATNSM	0.0	6	111.0	2880.0	4010.0			AIRSAT-5A,5B
30	ASATNSM	0.0	6	111.0	2880.0	3710.0			AIRSAT-5C,5F
31	ASATNSM	1.0	1	111.0	2880.0	3710.0	2880.0	3175.0	AIRSAT-5F
32	ASATNSM	0.0	2	111.0	2880.0	5820.0			AIRSAT-5D
33	ASATNSM	1.0	1	111.0	2880.0	5820.0	4631.0	5351.0	AIRSAT-5D
34	ASATNSM	1.0	3	111.0	2880.0	2.9	2880.0	3210.0	AIRSAT-5E(TRUNC)
35	ASATNSM	0.0	1	111.0	2880.0	5630.0			AIRSAT-5G
36	ASATNSM	1.0	2	111.0	2880.0	5630.0	2880.0	3009.0	AIRSAT-5G(TRUNC 60)
37	ASATNSM	1.0	1	111.0	2880.0	5630.0	5808.0	6528.0	AIRSAT-5G(TRUNC SH)
38	ASATNSM	0.0	2	111.0	2880.7	3860.0			AIRSAT-5H
39	ASATNSM	0.0	2	111.0	2880.0	5426.8			AIRSAT-5I
40	ASATNSM	1.0	1	111.0	2880.0	5426.8	5252.0	5972.0	AIRSAT-5I
41	ASATNSM	0.0	4	111.0	2880.0	3862.6			AIRSAT-5J
42	ASATNSM	0.0	3	132.0	4320.0	3766.9			AIRSAT6A,
43	ASATNSM	0.0	3	132.0	4321.3	3766.7			AIRSAT6B,
44	ASATNSM	0.0	4	132.0	4320.0	3767.9			AIRSAT6C,
45	ASATNSM	0.0	3	132.0	4320.0	3767.0			AIRSAT6D,

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## SECTION VI: SATURATION

### C. ASATEDU

- 120 dives: 13 DCS, 27 Marginal
- All dives were dry except for some short wet excursions to evaluate the test helmet (MK 12 SSDS) for noise.
- Dives were conducted over different periods that cover 1979 - 1988:

#### NEDU Test Plan #

March 1979	79-08
July 1979	79-30
August 1979	79-38
February 1981	81-08
April 1981	81-13
January 1983	82-41
January 1983	83-42
Oct-Nov 1983	83-46
November 1984	84-42
March 1986	86-06
April 1987	??
January 1988	88-01
March 1988	88-03

- Exercise: essentially none. There was no exercise regimen described in the protocol, however, the activities surrounding the preparations and testing of the helmet in the wetpot were part of the daily routine.
- This dataset is included in the report, Statistically Based Decompression Tables VII.
- No report was completed and published for this series. Descriptions of the studies and DCS manifestations were collected from the medical records, log books, personal communications and summary sheets. Some additional dive information is described in Report VII.

There are no references that specifically summarize DCS events, however, dives from the Test Plans indicated above contributed to this data set and ultimately resulted in USN Treatment Table 7 (E.D. Thalmann). The following technical report also resulted from part of this work.

1. Knafelc ME and MD Curley. Evaluation of a communication beanie for use with the MK 12 SSDS. Naval Experimental Diving Unit, Technical Report No. 4-87. April 1987.

## SECTION VI: SATURATION

### C. ASATEDU 120 Dives: 13 DCS, 27 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
2	DCS	-795	-75	Right knee pain; 75 min before surfacing; TT5 2 hrs post dive
3	DCS	-750	-30	Left shoulder pain; 30 min before surfacing; TT5 2 hrs post dive
4	DCS	-900	-180	Tightness right knee; 3 hrs before surfacing; TT5 4.5 hrs post dive; Repeat TT6 24 hrs post dive
5	DCS	120	2880	Bilateral knee and ankle aches; 48 hrs after surfacing; TT5 60 hrs post dive
7	DCS	-570	150	Right knee pain 2.5 hrs after surfacing; lots of pulmonary Sx on bottom; TT6 5 hrs post dive
8	DCS	-510	210	Right knee pain; 3.5 hrs after surfacing; TT6 5 hrs post dive
9	DCS	-600	120	Right ankle pain, lightheadedness; 2 hrs after surfacing; no Sx but tired at 7 fsw; TT6 5 hrs post dive;
11	DCS	-570	150	Bilateral knee pain, paresthesias 2.5 hrs after surfacing; pulmonary Sx on bottom; TT6 12 hrs post dive ( <i>PKW note: log says 23.5 hr</i> )
12	Marginal			Fatigue; not treated [total: 3 fatigue]
14	DCS	-740	0	Right knee pain at 14 FSW during decompression (12 hrs into decompression); at 14 hrs into decompression (12 FSW) all divers recompressed to 28 FSW for 2 hrs. Decompression resumed from 28 FSW (divers felt less post dive fatigue); <i>note from other pg: bend @ 12 fsw 21% O<sub>2</sub></i>
16	Marginal			Post-dive fatigue; not treated [total: 4 fatigue]
17	DCS	-721	-1	Left knee pain; 6 hrs before surfacing which increased after surfacing; other page says at 4 fsw; TT5 40 min post dive
18	Marginal			Post-dive fatigue lasted 24-48 hours; not treated [total: 10 fatigue]
19	DCS	120	480	Right elbow ache 8 hrs post dive; TT5 - 72 hrs post dive; TT6 - 96 hrs post dive
20	Marginal			Post-dive fatigue; not treated [total: 7 fatigue]
21	Marginal			Post-dive fatigue; not treated [total: 2 fatigue]
25	Marginal	-1841	-1389	Niggle after arrival at 30 fsw, same at air 20, air 10



28	DCS	120	695	<p>Post dive note 15 Mar 86 - air sat 60 fsw, 5 days, no complaints, feeling well. 16 Mar 86 @ 0930 hrs - after waking up this AM states it was warm to touch and had "deep seated left knee pain" States it felt like he had a long bike ride. Has had problems with knees in the past. Pain just below knee cap now, neuro-intact, crepitus under patella (<i>sic</i>) L&gt;R, joint FROM, no tenderness to palpation showed pain in area of inf platellar tendon (<i>sic</i>); A: tendonitis doubtful DCS; P: Motrin 400 mg &amp; tab po E6hr, RTC if pain progresses. Follow-up Tues otherwise.</p> <p><b>18 Mar 86 Treatment record:</b> seen at 0930 at unit, checked by Dr. Knafecl. Symptoms minimal at that time. Not treated. Given Motrin. Pain has increased since then. Pain now 5-6 out of 10. No previous bends. Dx: DCS Type I; TT6 with 2 ext at 60 fsw; time of recompression 0845; @ 60 fsw end of 2nd O<sub>2</sub> period slight decrease in pain (5/10) remained at 5/10 through end of 3rd, 4th, 5th O<sub>2</sub> periods; upon arrival at 30 fsw pain decreased to 4/10, at end of 1st O<sub>2</sub> period still 3/10 mild discomfort on deep insp. End Rx: has decreased further to 2/10</p> <p><b>19 Mar 86:</b> F/U DCS Pain in left knee has decreased since end of Rx yesterday from 2/10 to 1/10. Also much better localized now compared to diffuse pain yesterday. Treatment Table 6 today - results: considerable improvement, pain residual is still present however. At about 1/2 on scale of 10. Neuro of leg is normal. RTC in a.m.</p> <p><b>20 Mar 86 F/U DCS.</b> Vague discomfort still present in knee. Treated on Table 6 again but discomfort actually increased slightly during treatment.</p> <p><b>21 Mar 86 F/U DCS.</b> Discomfort still present. Increased to 2/10 last p.m. - now stable. No further Rx today since TT6 yesterday actually made pain slightly worse. Will treat with Motrin (400 mg q 6 h) over the weekend and re-evaluate on Monday.</p> <p><b>24 Mar 86 F/U DCS,</b> Pain increased over weekend. Now 4/10 despite Motrin, rest, and ice over the weekend. Still no neuro s/s. Recompress today.</p>
32	DCS	-2884	290	<p>06 Mar 88 "Decompression Sickness Treatment Record": Dive Profile - Air Sat 88B 50 FSW Air algorithm ascent on upward excursion 24 FSW to surface; time surfaced: 0802. 1130 slight visual disturbance, followed at 1230 by numbness in 4th, 5th left fingers; "not all together there" - "peripheral vision in/out" "5th/4th finger numbness in &amp; out, left hand" "sparks left vis. field" (<i>note in margin with small crude illustrations "orthostatistics not symptomatic"</i>); Now wonders if he had trouble at 50 fsw during sat dive, noted very slight occasional balance problem - every 6 hours might catch himself off balance. Dx: Type II DCS cerebral, mild; TT6, time of recompression 1410 @ 60 fsw, complete relief of mental "fuzzyness", (<i>sic</i>) especially in retrospect. Felt like a veil lifting.</p> <p><b>16 Mar 88 - S.</b> noted very mild left knee 8 March 88 right after a long run minimal discomfort persists O. Normal ROM; no swelling A. Mechanical knee pain due to overuse P. Reduce running RTC 5 days</p> <p><b>Undated POST DIVE NOTE:</b> subject is 2 weeks post NEDU Air Sat 88 Bravo, Test Plan No. 88/03. Subject completed the Air/N O dive to 150 FSW maximum and saturation staged decompression from storage depths of 50 and 24 FSW. In water EX 19 and Dry Semi-Open Circuit (SOCBA) graded exercises were also completed during the dive.</p> <p>This subject performed: EX 19 dives (1) @ 150 fsw (2) @ 57 fsw (1) @ 31 fsw SOCBA graded exercises (3) @ 50 fsw, (3) @ 24 fsw</p> <p>On this date he has no residual effects of the decompression or studies conducted during this saturation dive.</p> <p>Comments: mild knee pain on left following a long run 2 days after dive, resolved completely. Central nervous system decompression sickness after surfacing, resolved completely with Treatment Table 6.</p>

**Note: in this dataset, all cases of DCS represent only one individual; the number of divers represented per profile number in the marginal cases are indicated in brackets.**

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	ASATEDU	0.0	6	60.0	2760.0	1260.0			NEDU TEST 79-8 REPETS=1
2	ASATEDU	1.0	1	60.0	2760.0	1260.0	3225.0	3945.0	NEDU TEST 79-8 REPETS=1
3	ASATEDU	1.0	1	60.0	2760.0	1260.0	3270.0	3990.0	NEDU TEST 79-8 REPETS=1
4	ASATEDU	1.0	1	60.0	2760.0	1260.0	3120.0	3840.0	NEDU TEST 79-8 REPETS=1
5	ASATEDU	1.0	1	60.0	2760.0	1260.0	4140.0	6900.0	NEDU TEST 79-8 REPETS=1
6	ASATEDU	0.0	7	60.0	4896.0	1620.0			NEDU TEST 79-30 REPETS=1
7	ASATEDU	1.0	1	60.0	4896.0	1620.0	5946.0	6666.0	NEDU TEST 79-30 REPETS=1
8	ASATEDU	1.0	1	60.0	4896.0	1620.0	6006.0	6726.0	NEDU TEST 79-30 REPETS=1
9	ASATEDU	1.0	1	60.0	4896.0	1620.0	5916.0	6636.0	NEDU TEST 79-30 REPETS=1
10	ASATEDU	0.0	6	60.0	5655.0	1645.0			NEDU TEST 79-38 REPETS=1
11	ASATEDU	1.0	1	60.0	5655.0	1645.0	6730.0	7450.0	NEDU TEST 79-38 REPETS=1
12	ASATEDU	0.5	3	60.0	5655.0	1645.0	0.0	0.0	NEDU TEST 79-38 REPETS=1
13	ASATEDU	0.0	9	60.0	5820.0	2061.0			NEDU TEST 81-8 RECOMP 12-2
14	ASATEDU	1.0	1	60.0	5820.0	740.0	5820.0	6560.0	NEDU TEST 81-8 RECOMP 12-2
15	ASATEDU	0.0	6	60.0	5896.0	1622.0			NEDU TEST 81-13, REPETS=
16	ASATEDU	0.5	4	60.0	5896.0	1622.0	0.0	0.0	NEDU TEST 81-13, REPETS=
17	ASATEDU	1.0	1	60.0	5896.0	1622.0	6797.0	7517.0	NEDU TEST 81-13, REPETS=
18	ASATEDU	0.5	10	60.0	5569.0	1763.0	0.0	0.0	NEDU TEST 82-41 REPETS=1
19	ASATEDU	1.0	1	60.0	5583.0	1760.0	7463.0	7823.0	NEDU TEST 83-42 EXCURS=1
20	ASATEDU	0.5	7	60.0	5583.0	1760.0	0.0	0.0	NEDU TEST 83-42 EXCURS=1
21	ASATEDU	0.5	2	60.0	5583.0	1760.0	0.0	0.0	NEDU TEST 83-42 REPET =1
22	ASATEDU	0.0	9	60.0	5589.0	2163.0			NEDU TEST 83-46 EXCURS=1
23	ASATEDU	0.0	1	60.0	5589.0	2163.0			NEDU TEST 83-46 REPETS=1
24	ASATEDU	0.0	8	60.0	5643.0	1841.0			NEDU TEST 84-42 REPETS=1
25	ASATEDU	0.5	1	60.0	5643.0	1841.0	5643.0	6095.0	NEDU TEST 84-42 REPETS=1
26	ASATEDU	0.0	1	60.0	5280.0	2204.0			NEDU TEST 84-42 REPETS=1
27	ASATEDU	0.0	4	60.0	4374.0	2162.0			NEDU TEST 86-06 EXCURS=9
28	ASATEDU	1.0	1	60.0	4374.0	2162.0	6656.0	7231.0	NEDU TEST 86-06 EXCURS=9
29	ASATEDU	0.0	9	60.0	7020.0	1840.0			NEDU TEST APR-87 REPETS=
30	ASATEDU	0.0	7	50.0	4210.0	2883.0			NEDU TEST 88-01 EXCURS=1
31	ASATEDU	0.0	7	50.0	4320.0	2884.0			NEDU TEST 88-03 EXCURS=1
32	ASATEDU	1.0	1	50.0	4320.0	2884.0	4320.0	7494.0	NEDU TEST 88-03 EXCURS=1

## **SECTION VI: SATURATION**

### **D. SUREX & SUREXM**

- 64 dives: 5 DCS, 3 Marginal
- All dives were dry in a chamber.
- Dives were conducted during the period May 1981 - May 1983
- Exercise: none
- This dataset is included in the report, Statistically Based Decompression Tables VII. As indicated there, SUREX represents these dives as they actually occurred. SUREXM considers each excursion as independent.
- The experimental design is described in reference 1. DCS manifestations were summarized in ref (1) as Type I, Type II or pruritis; marginals were not included. Additional comments for the DCS cases and the marginal events were obtained from the medical logs.

1. Eckenhoff, RG and Parker, JW. Latency in onset of decompression sickness on direct ascent from air saturation. Journal of Applied Physiology 56:1070-1075, 1984.

## SECTION VI: SATURATION

### D. SUREX & SUREXM

64 Dives: 5 DCS, 3 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
1	DCS	-4566	-4550	At 4336.0 subject complained of hip pain (x); 7300.63 complained of itching back arms and legs; 7440 resolved
2	DCS	-4566	-4550	At 4336.0 subject complained of auxiliary pain and motor/sensory deficit(x); Tx with O <sub>2</sub> X 2 hr
5	DCS	-6006	-5992	At 2895.0 subject complained of knee pain(x); resolved on recompression at 20 fsw
7	DCS	-846	-126	Subject complained of at 8760.0(X); resolved with TT6 ( <i>sic.</i> , <i>did not indicate Sx</i> )
10	marginal	-4566	-4550	At 4336.0, 0 subject complained of mild pain in left knee; resolved at 4338.66, 25 ( <i>Weathersby note: niggle at + 15m</i> )
11	marginal	-3126	-3117	At 5763.0, subject complained of weakness in knees; 5769.0, complained of tightness in chest; symptoms resolved spontaneously (later note: niggle T <sub>1</sub> -T <sub>2</sub> span 65)
14	DCS	-3188	-3056	At 4329.58 subject complained of "skin bends"; all symptoms resolved on recompression 4349.75; 4452.0@ complained of right knee pain (X)
15	marginal	-3188	-3184.5	At 4323.45 subject complained of right ankle discomfort (MO entry "not DCS"); ( <i>Weathersby note: niggle</i> )

SUREX.dat - the dives as they actually occurred

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	SUREX	1.0	1	65.0	6960.0	1926.0	4320.0	4336.0	SUREX1,
2	SUREX	1.0	1	65.0	6960.0	1926.0	4320.0	4336.0	SUREX1,
3	SUREX	0.0	1	65.0	6960.0	1926.0			SUREX1,
4	SUREX	0.0	3	65.0	6960.0	1926.0			SUREX2,
5	SUREX	1.0	1	65.0	6960.0	1926.0	2880.0	2894.0	SUREX3,
6	SUREX	0.0	2	65.0	6960.0	1926.0			SUREX3,
7	SUREX	1.0	1	65.0	7020.0	1866.0	8040.0	8760.0	SUREX4,
8	SUREX	0.0	2	65.0	7020.0	1866.0			SUREX4,
9	SUREX	0.0	3	65.0	6960.0	1926.0			SUREX5,
10	SUREX	0.5	1	65.0	6960.0	1926.0	4320.0	4336.0	SUREX6,
11	SUREX	0.5	1	65.0	6960.0	1926.0	5760.0	5769.0	SUREX6,
12	SUREX	0.0	1	65.0	6960.0	1926.0			SUREX6,
13	SUREX	0.0	3	75.0	5460.0	2060.7			SUREX7,
14	SUREX	1.0	1	75.0	5460.0	2048.0	4320.0	4452.0	SUREX8,
15	SUREX	0.5	1	75.0	5460.0	2048.0	4320.0	4323.5	SUREX8,
16	SUREX	0.0	1	75.0	5460.0	2048.0			SUREX8,

SUREXM.dat - representing each excursion as independent

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX1,
2	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX2,
3	SUREXM	1.0	1	65.0	6960.0	1926.0	2880.0	2894.0	SUREX3,
4	SUREXM	0.0	2	65.0	6960.0	1926.0			SUREX3,
5	SUREXM	0.0	3	65.0	7020.0	1866.0			SUREX4,
6	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX5,
7	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX6,
8	SUREXM	1.0	2	65.0	6960.0	1926.0	4320.0	4336.0	SUREX1,
9	SUREXM	0.0	1	65.0	6960.0	1926.0			SUREX1,
10	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX2,
11	SUREXM	0.0	2	65.0	6960.0	1926.0			SUREX3,
12	SUREXM	0.0	3	65.0	7020.0	1866.0			SUREX4,
13	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX5,
14	SUREXM	0.5	1	65.0	6960.0	1926.0	4320.0	4336.0	SUREX6,
15	SUREXM	0.0	2	65.0	6960.0	1926.0			SUREX6,
16	SUREXM	0.0	2	65.0	6960.0	1926.0			SUREX1,
17	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX2,
18	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX3,
19	SUREXM	0.0	3	65.0	7020.0	1866.0			SUREX4,
20	SUREXM	0.0	3	65.0	6960.0	1926.0			SUREX5,
21	SUREXM	0.5	1	65.0	6960.0	1926.0	5760.0	5769.0	SUREX6,
22	SUREXM	0.0	2	65.0	6960.0	1926.0			SUREX6,
23	SUREXM	0.0	3	75.0	5460.0	2060.7			SUREX7,
24	SUREXM	0.0	3	75.0	5460.0	2048.0			SUREX8,
25	SUREXM	0.0	3	75.0	5460.0	2060.7			SUREX7,
26	SUREXM	1.0	1	75.0	5460.0	2048.0	4320.0	4452.0	SUREX8,
27	SUREXM	0.5	1	75.0	5460.0	2048.0	4320.0	4323.5	SUREX8,
28	SUREXM	0.0	1	75.0	5460.0	2048.0			SUREX8,

## SECTION VI: SATURATION

### E. ASATNMR

- 50 dives: 1 DCS, 0 Marginal
  - All dives were dry with some short wet excursions
  - Dives were conducted during the period June-August 1986, and July 1988.
  - Exercise: none except on excursions; based on notes only, "moderately heavy workloads while immersed."
  - This dataset is included in the report, Statistically Based Decompression Tables VII.
  - DCS manifestation descriptions were taken directly from the archived medical folders. No report was ever completed that compiled the results and presented the medical events for these dives. However, the references (1-8) below resulted from studies that were also performed during this series. Principle Investigators: E.T. Flynn (1986) and E.D. Thalmann (1988). The electronic dive profiles were reconstructed through the efforts of P.K. Weathersby using summary sheets and the original dive logs.
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  2. Doubt TJ, DJ Smith. Coldex 86: Physical work capacity during prolonged cold water immersion at 6.1 msw. Bethesda, Maryland: Naval Medical Research Institute Technical Report, NMRI #90-135, 1990.
  3. Doubt TJ, RP Weinberg, DJ Smith, PA Deuster, AJ Dutka, ET Flynn. Coldex-86: Summary of the experimental protocol and general results. Bethesda, Maryland: Naval Medical Research Institute Technical Report, NMRI #90-132, 1990.
  4. Dutka AJ, DJ Smith, TJ Doubt, RP Weinberg, ET Flynn. Coldex-86: Event-related potentials after prolonged cold water immersion: Possible evidence for impairment of cognitive function with minimal lowering of core temperature. Bethesda, Maryland: Naval Medical Research Institute Technical Report, NMRI #90-134, 1990.
  5. Weinberg RP, DJ Smith, TJ Doubt, AJ Dutka. Coldex-86: Thermal aspects of long term cold water immersion. NMRI Technical Report 89-04, 1989.
  6. Doubt TJ, DJ Smith. Lack of diurnal effects on periodic exercise during prolonged cold water immersion. Undersea Biomedical Research 17(2):149-157, 1990.
  7. Duester PA, DJ Smith, BL Smoak, BL Montgomery, A Singh, TJ Doubt. Prolonged whole body cold water immersion: fluid and ion shift. Journal of Applied Physiology, 66(1): 34-41, 1989
  8. Smith DJ, PA Duester, CJ Ryan, TJ Doubt. Prolonged whole body cold water immersion: hormonal and metabolic changes. Undersea Biomedical Research, 17(2): 139-48, 1990.

# SECTION VI: SATURATION

## E. ASATNMR 50 Dives: 1 DCS, 0 Marginal

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
34	119.6	164.6	Type I. Asymptomatic at 30 min and 2 hrs post dive; diver went home shortly after 2 hr exam; approx 45 min later began to experience dull ache in medial aspect of distal left femur just above the knee. Pain worsened to become so severe that he had to be driven to chambers; could not walk unassisted. Arrived at chamber 1220 (4 hr 20 min post surface); Neuro exam could not be done because subject was in too much pain; compressed to 60 fsw to begin TT6, left surface at 1301 with some relief during descent; reached bottom at 1304 with some pain still present. On O <sub>2</sub> at 1304 with complete relief of symptoms at 1312. Off O <sub>2</sub> at 1324 when a complete neuro exam was done - no abnormalities. Surfaced at 1852, examined at 1800 normal neuro and no pain; patient stated he had trouble clearing during descent and current pain in left ear; exam revealed erythematous left tympanic membrane

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	ASATNMR	0.0	1	20.0	5767.0	14.0			**DIVE # 1,
2	ASATNMR	0.0	1	20.0	5767.0	14.0			**DIVE # 1,
3	ASATNMR	0.0	1	20.0	5767.0	14.0			**DIVE # 1,
4	ASATNMR	0.0	1	20.0	5767.0	14.0			**DIVE # 1,
5	ASATNMR	0.0	1	20.0	6165.0	13.0			DIVE # 2,
6	ASATNMR	0.0	1	20.0	6165.0	13.0			DIVE # 2,
7	ASATNMR	0.0	1	20.0	6165.0	13.0			DIVE # 2,
8	ASATNMR	0.0	1	20.0	6165.0	13.0			DIVE # 2,
9	ASATNMR	0.0	1	20.0	5810.0	13.4			DIVE # 3,
10	ASATNMR	0.0	1	20.0	5810.0	13.4			DIVE # 3,
11	ASATNMR	0.0	1	20.0	5810.0	13.4			DIVE # 3,
12	ASATNMR	0.0	1	20.0	5810.0	13.4			DIVE # 3,
13	ASATNMR	0.0	1	20.0	6181.0	10.2			DIVE # 4,
14	ASATNMR	0.0	1	20.0	6181.0	10.2			DIVE # 4,
15	ASATNMR	0.0	1	20.0	6181.0	10.2			DIVE # 4,
16	ASATNMR	0.0	1	20.0	6181.0	10.2			DIVE # 4,
17	ASATNMR	0.0	1	20.0	5795.0	13.0			DIVE # 5,
18	ASATNMR	0.0	1	20.0	5795.0	13.0			DIVE # 5,



19	ASATNMR	0.0	1	20.0	5795.0	13.0	DIVE # 5,
20	ASATNMR	0.0	1	20.0	5795.0	13.0	DIVE # 5,
21	ASATNMR	0.0	1	20.0	6180.0	10.0	DIVE # 6,
22	ASATNMR	0.0	1	20.0	6180.0	10.0	DIVE # 6,
23	ASATNMR	0.0	1	20.0	6180.0	10.0	DIVE # 6,
24	ASATNMR	0.0	1	20.0	6180.0	10.0	DIVE # 6,
25	ASATNMR	0.0	1	20.0	6179.0	13.2	**DIVE # 7,
26	ASATNMR	0.0	1	20.0	6179.0	13.2	**DIVE # 7,
27	ASATNMR	0.0	1	20.0	6179.0	13.2	**DIVE # 7,
28	ASATNMR	0.0	1	20.0	6179.0	13.2	**DIVE # 7,
29	ASATNMR	0.0	1	20.0	5821.0	12.9	DIVE * 8,
30	ASATNMR	0.0	1	20.0	5821.0	12.9	DIVE * 8,
31	ASATNMR	0.0	1	20.0	5797.0	12.9	DIVE * 8,
32	ASATNMR	0.0	1	20.0	5797.0	12.9	DIVE * 8,
33	ASATNMR	0.0	17	24.0	4320.0	0.4	NMRI JUL 88
34	ASATNMR	1.0	1	24.0	4320.0	0.4	NMRI JUL 88
					4440.0	4485.0	

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## **SECTION VI: SATURATION**

### **F. NMR9209**

- 48 dives: 2 DCS, 5 Marginal
- All dives were dry.
- Dives were conducted from January - May 1993
- Exercise: none
- No report was completed and published for this series. Descriptions of the studies and DCS manifestations were obtained directly from the archived medical files and dive logs. Cases of DCS and marginal cases were diagnosed retrospectively on 22 October 1996 at NMRI using the 1988 diagnostic scoring criteria established by Weathersby. Participating DMOs in the diagnoses:
  - CDR C. Auker
  - LCDR R. Ball
  - LCDR C. Toner
  - LCDR D. Valaik
  - LT T. Buttolph

No references; dives were the result of NMRI protocol #92-09: "Shallow Air Saturation No-Decompression Dive Series" December 1992.

# SECTION VI: SATURATION

F. NMR9209

48 Dives: 2 DCS, 5 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
2	marginal	120	360	<p><b>Note dtd 28 Jan:</b> "Niggles" retropatellar left knee pain post dive @ ~1600 ; also right wrist and left 2/3 MP transient pain in PM post dive; All Sx were transient, resolving w/in minutes and prior to seeking eval.</p> <p><b>Post dive interview 29 Jan:</b> transient left knee pain lasting &lt;1 min in evening (~ 8 hr post surfacing); Sx were c/w previous Sx of PFS. Also c/o fleeting right wrist and left 2,3 MP joint pain in PM post dive. No recurrence or other symptoms since.</p> <p><b>Post dive interview 29 Jan:</b> ...noted transient left knee pain yesterday ~1600 while descending stairs - has prior problem with retropatellar stress; also yesterday noted very fleeting pains in right wrist, left 2,3 MP joints; this morning woke with headache right sided, pounding, "hangover" type. Has had similar mild headaches in the past. Exacerbated by moving around, it is minimal at present time (r 98.2, P ?8, BP 110/62)... equivocal niggles, minimal vascular cephalgia; Rx aspirin &amp; follow-up.</p> <p><b>Post dive interview 02 Feb:</b> subject developed left 3rd digit "dull pain @ MP joint "when picking things up" - applying palmer stress @ MP joint. Pain present only when stressed. No other Sx. Sx developed ~ 4 days post dive, denies trauma. Px - tenderness elicited with active resistance in dorsal direction @ left 3rd MP joint, NT to passive ROM or palpation; neuro completely intact; A: left 3rd MP arthralgia, <u>unlikely</u> decompression related in origin; P: observation. Pt counseled on progression of Sx or new Sx which may occur - instructed to call immediately.</p> <p><b>Note dtd 02 Feb:</b> Esophageal bloom inserted thru left nare with 2% lidocaine with difficulty; diver tried 4 times. DMO was requested, diver agreed. DMO interviewed subject, and decided to go ahead with the submax study without the esophageal bloom insertion; diver agreed.</p>
3	marginal	120	1260	<p><b>Post dive interview 29 Jan:</b> developed wrist pain ~0500 this AM awakening him from sleep, described as deep boring pain in left wrist; resolved complete within ~3-4 min and has not recurred; he has had similar niggles during past dives, but has never had frank decompression illness</p> <p><b>Post Dive note 29 Jan:</b> subject noted left wrist pain at 21 hrs post surfacing; Sx were transient, lasted 3-5 min and resolved prior to pursuing evaluation; no other Sx or subsequent Sx; was normal in AM post surfacing; A: "niggles"</p>
6	DCS	120	1440	<p><b>Dx: musculoskeletal DCI</b></p> <p><b>Summary:</b> presented 24 hrs after surfacing c/o right shoulder and wrist pain, deep and constant in character, unrelieved and not exacerbated by position or movement. No neurological symptoms or signs; treated by recompression to 60 ft. Partial relief at 60' reduced to minimal symptoms after one O<sub>2</sub> breathing extension at 60'. Patient reported complete relief of Sx during second O<sub>2</sub> period at 30'. Uneventful decompression to surface on USN TT6 with 1 ext at 60 fsw.</p>

7	DCS	120	660	<p><b>Post-dive note 25 Feb 93:</b> Post dive exam - no post dive problems. Neuro exam performed completely WNL.</p> <p><b>Post-dive note 25 Feb 93:</b> 1900 Pt presented with c/o pain both ankles, both knees, deep and boring in character, aggravated by joint movement. Onset first in ankles today, progressive over several hours, then involving knees. No other explanation for pain - has not done any PT. Feels well otherwise. Pain at present time is sufficiently severe that he is having difficulty walking. Has no other symptoms, no weakness, no numbness, no bowel/bladder Sx. Joints full range of motion without crepitus, not inflamed. Detailed neuro exam is normal. A(1) s/p experimental saturation dive (2) pain only decompression illness P(1) Recompress 60 fsw; Note: pain promptly and completely relieved on reaching depth. Recommend bring him out on TT6 with at least 1 O<sub>2</sub> ext at 60 fsw and 1 at 30 fsw.</p> <p><b>Note 26 Feb 93:</b> 0130 Surfaced from TT6 with 1 extension at 60 fsw and 1 extension at 30 fsw. Diver notes minimal substernal burning discomfort on inspiration, has no joint discomfort. Lungs clear.</p> <p><b>Note 26 Feb 93:</b> 0810 Treated for pain only musculoskeletal DCI last night. Now symptoms free but tired.</p> <p><b>note 29 Mar 93:</b> Subject had no symptoms after TT6. About one week later noted intermittent, occasional pain with varus stress of left knee. No other symptoms. No symptoms at rest. Pain recurs only with varus stress, intermittent &amp; rapidly self-limited.</p> <p><b>Incident summary:</b> Presented 11 hours after surfacing from a 22 foot air saturation dive complaining of bilateral ankle and knee pain, deep and boring in character, aggravated by joint movement. No other symptoms or signs. Diagnosed as pain only decompression sickness.</p> <p>Treatment by recompression to 60 FSW. Total relief of pain upon reaching depth. Uneventful decompression to the surface on USN TT6 with one extension at 60 FSW and one extension at 30 FSW. On surface normal to examination.</p>
9	marginal	120	720	<p><b>pre-dive note 08 Mar:</b> on Septra for ongoing prostatitis;</p> <p><b>pre dive note 08 Mar:</b> repeats prostatitis descrip, past Hx of Type II DCS, subsequently has recurrent symptoms of sensory disturbance on left face, arm and/or leg. He is taking ASA for this and it seems to be having a beneficial effect in fewer number of spells of the sensory symptoms; clear for protocol dive. During dive he is to continue present regimen of Septra and ASA; also cleared to dive by DMO Ball</p> <p><b>in-dive note 11 Mar:</b> c/o productive cough, sinus congestion, frontal "pressure" HA, PND since last PM. States no SOB or CP, no fever but states increased sweating last PM. Currently on Septra for prostatitis ??? "strep" prostatitis 2 wks ago; min nasal congestion, no sinus tenderness or D/C, no PND. Tms clear. Pharynx clear, Neck, no lymphadenopathy. Lungs min. "B" basilar wheezing - symmetric Cor - RRR without "M". A: acute bronchitis while on TMP/SMX; likely viral in etiology. P: increase PO fluids, Tylenol 650 q 4° PRN, sputum Cx, will decompress on decongestant in AM if still congested, follow closely will change Abx if condition worsens</p> <p><b>post dive note 12 Mar:</b> right temporal headache remains with URTI symptoms - Rx Dimatapp, otherwise asymptomatic; Chest, few medium ??? both lower zones posteriorly Pn R = L; ears OK; URTI symptoms, otherwise NAD</p> <p><b>late entry 15 Mar:</b> Phone interview 24 hr post dive subject reports niggle in right foot ~12 hr after surfacing; at 24 hrs asymptomatic; his URTI symptoms are persisting with HA rash on neck, blister on lips and 1 ?ingrown? unable to exam due to snowstorm. A/P: 1. post dive niggle 2. URTI</p>

10	marginal	119.4	720	Cleared to dive by two DMOs; pre dive note by a 3rd DMO indicated diver certain she is not pregnant and expects next menstruation in ~ 3 days <b>Post dive note 12 Mar:</b> asymptomatic, feels well <b>Late entry 15 Mar:</b> phone interview due to snowstorm at 24 hrs revealed subject had transient pain between 10 and 12 hrs post dive in her right shoulder lasting seconds and going away completely; at 24 hrs she was asymptomatic. A/P post dive giggles now resolved <b>late entry 16 Jul :</b> same as above
14	marginal	-18.9	128	cleared for dive by DMO <b>post dive note 29 Apr:</b> c/o intermittent brief (secs) 1/10 pain behind right knee since decompression, none now; CNII-XII intact; sens intact to fine touch; motor 5/5; cerebellar FTM/HTS intact; rhombeng nl, tandem gait nl, heel/toe walk nl; A/P: possible niggle - observe carefully RTC if pain worsens <b>24 hr check 30 Apr:</b> had discomfort on weight bearing right knee yesterday - now completely well; no problems

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	nmr9209	0.0	4	22	4399.5	7.0			NMRI 9209 AIRSAT NO-D(25-
2	nmr9209	0.5	1	22	4399.5	7.0	5018.2	5258.2	NMRI 9209 AIRSAT NO-D(25-
3	nmr9209	0.5	1	22	4399.5	7.0	5018.2	6158.2	NMRI 9209 AIRSAT NO-D(25-
4	nmr9209	0.0	6	22	4298.6	12.0			NMRI 9209 AIRSAT NO-D(08-
5	nmr9209	0.0	4	22	4303.1	12.0			NMRI 9209 AIRSAT NO-D(22-
6	nmr9209	1.0	1	22	4303.1	12.0	4909.9	6229.9	NMRI 9209 AIRSAT NO-D(22-
7	nmr9209	1.0	1	22	4303.1	12.0	4909.9	5449.9	NMRI 9209 AIRSAT NO-D(22-
8	nmr9209	0.0	4	20	4312.8	7.0			NMRI 9209 AIRSAT NO-D(09-
9	nmr9209	0.5	1	20	4312.8	7.0	4940.6	5540.6	NMRI 9209 AIRSAT NO-D(09-
10	nmr9209	0.5	1	20	4312.8	7.0	4940.6	5540.6	NMRI 9209 AIRSAT NO-D(09-
11	nmr9209	0.0	6	20	4301.2	8.0			NMRI 9209 AIRSAT NO-D(15-
12	nmr9209	0.0	6	20	4284.0	7.1			NMRI 9209 AIRSAT NO-D(22-
13	nmr9209	0.0	5	20	4301.8	12.0			NMRI 9209 AIRSAT NO-D(26-
14	nmr9209	0.5	1	20	4301.8	12.0	4798.2	4945.1	NMRI 9209 AIRSAT NO-D(26-
15	nmr9209	0.0	6	20	4307.2	9.1			NMRI 9209 AIRSAT NO-D(10-

## SECTION VI: SATURATION

### G. EDUAS45

- 26 dives: 8 DCS, 4 Marginal
- All dives were dry
- Dives were conducted during October 1945 and July 1946.
- Exercise: none recorded.
- Dive descriptions were obtained from dive log (NEDU Log #28 and #29). Manifestation descriptions were taken from a personal communication from Dr. Van der Aue to Dr. Behnke (copy obtained from the collection of correspondence and data given to Dr. Ed Flynn by the surviving son of Dr. Van der Aue after his death). These dives are also discussed in reference 1.
- Diagnoses of DCS were initially made by Dr. Van der Aue. Re-diagnoses were made in February 1999 using the criteria established by Weathersby in 1988 (appendix A). The re-diagnoses were made by collective decision of the following:
  - CDR Charles Auker MC USN
  - LCDR Robert Ball MC USNR
  - LCDR Charles Toner MC USN
  - LCDR Daniel Valaik MC USN
  - LT Thomas Buttolph MC USN
  - LT David Dromsky, MC, USN

1. Behnke, AR. "Early quantitative studies of gas dynamics in decompression." In: The Physiology and Medicine of Diving and Compressed Air Work. PB Bennett and DH Elliott, editors. Second edition. Williams & Wilkins Company, Baltimore, MD, 1975. pp. 392-416.

# SECTION VI: SATURATION

G. EDUAS45

26 Dives: 8 DCS, 4 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
3	DCS	-2	66	<p>17 Oct 45. No symptoms on or after reaching 33 feet. About 1 hour after final surfacing developed pain below left knee cap. Suddenly became worse - could hardly use leg in getting into chamber for recompression. Treatment as follows:</p> <p>L.S. 0325 R-60' 0409 R-40' on O<sub>2</sub> 0512  R-100' 0336 on oxygen L-40' on O<sub>2</sub> 0542  L-100' 0355 L-60' 0440 Reached surface on O<sub>2</sub> 0547  R-80' 0356 R-50' on O<sub>2</sub> 0441  L-80' 0408 L-50' on O<sub>2</sub> 0511</p> <p>On recompression obtained complete relief at 12 ft. No further symptoms during recompression. Residual soreness stiffness remained following day. Moderate post-dive fatigue on day following dive and treatment dive.</p>
5	Marginal	-2	150	<p>22 Oct 45 No symptoms at 99 feet except for gastric symptoms. No itch at any time of decompression. No joint pains developed at 33 foot stop. Developed pain in right elbow about 2 1/2 hours post dive lasting 5 minutes and disappearing. Severe post dive fatigue on day following dive.</p> <p>This man ate two sandwiches about 1030 while at 99 feet. Two more sandwiches were eaten at 1300. He said he felt as though gas was in his stomach which was relieved by belching. Came to 33 feet at 1717 and symptoms were not aggravated. At 1800, he ate one-half chicken. At 2300, abdominal cramps became severe. Vomited about 3 times during the night. Emerged from chamber complaining of severe cramps. Was given some Bismuth and Paragoric which he vomited 15 minutes later. Vomiting relieved cramps somewhat but his gastric upset continued. Left the Diving Unit at 1640. Vomited two times during P.M. prior to going home. On arriving home, he took a hot bath and had a light supper of soup and milk which he vomited at 1900. This was followed at 2000 with a severe headache for which he took aspirin. Two more severe vomiting spells bringing up thick bile stained vomitus took place. At 2330, headache disappeared, his stomach settled and he slept fairly well. Following day stomach was still sore but the gastric intestinal episode subsided.</p>
6	Marginal	0	0	<p>22 Oct 45. No symptoms while at 99 feet. On reaching 33 feet, he developed mild itch in his right ear lobe and anterior thigh during the ascent, promptly disappearing on reaching 33 feet. On reaching surface, no itch was noticed. No joint pains at any time of dive or post dive. Moderate fatigue during post-dive day.</p> <p>This man ate chicken at about 1800 while at 33 feet. On awakening in chamber at 0600, while at 33 feet, he had a dull pain over kidneys that disappeared on urinating. He also developed stomach cramps which continued for remainder of dive, not aggravated on reaching surface and disappearing 2-3 hours post dive (about 1300). Never did vomit. No diarrhea.</p>



7	Marginal	-2	1440	<p>22 Oct 45 No symptoms while at 99 feet. No symptoms on reaching 33 feet. Reached surface without symptoms. No pains or itch developed during post-dive day. Moderate fatigue with mild soreness on back was present. This man ate chicken at about 1800 while at 33 feet. About noon the following day (1 hour post dive), he began to have stomach cramps. These lasted all afternoon to about 1700 when they disappeared, but at this time he developed a severe headache. Took two aspirins and the headache finally disappeared. Slept well that evening. Had no vomiting or diarrhea with his gastro distress.</p>
8	DCS	0	90	<p>24 Oct 45 No symptoms at 99 feet, on reaching 33 feet, while at 33 feet or on coming to surface. No itch at any time. About 1030 on 25 Oct (about 1 1/2 hrs. post dive) he said his right knee and both ankles began to bother him. No pain but slight soreness and stiffness in these joints aggravated by weight bearing. By noon, discomfort was noticed only on weight bearing. Finally disappeared from right knee about 1800 and he felt normal that evening and the following day (10/25). On 10/27, he said he felt tired from waist level down, states his legs did not seem to possess normal strength. This was noticed also on 10/28, but on 10/29, he felt fairly well. No bladder symptoms.</p>
9	DCS	0	90	<p>24 Oct 45 No symptoms at 99 feet, on reaching 33 feet, while at 33 feet or on coming to surface. No itch at any time. About 1030 on 25 October (about 1 1/2 hours post dive) developed severe pain in left knee in area of outer semilunar cartilage. This continued and was severe enough to warrant recompression. Following treatment given:</p> <p>LS - 1109 R-60' 1158 R-40' 1304 on O<sub>2</sub>  R-100' 1114 on O<sub>2</sub> 1201 L-40' 1334 on O<sub>2</sub>  L-100' 1144 L-60' 1231 on O<sub>2</sub> Reach surface on O<sub>2</sub> 1339  R-80' 1145 R-50' 1232 on O<sub>2</sub>  L-80' 1157 L-50' 1302 on O<sub>2</sub></p> <p>On recompression, complete relief was obtained at 40 feet. No further symptoms during remainder of treatment of after treatment. Moderate fatigue remainder of day.</p>
10	DCS	0	120	<p>24 Oct 45 No symptoms at 99 feet, on reaching 33 feet, while at 33 feet or on coming to surface. No itch at any time. Moderate post dive fatigue. About 2230 (about 2 hours post dive) he noticed a mild steady pain in his right knee. He went to bed about midnight feeling slightly better. Was awakened at 0330 (10/26) with worse pain in his knee and slight fleeting pains in right ankle. Stayed up to 0400, felt a little better and fell asleep again. Following A.M. (10/26) had only slight soreness in his knee (no actual pain) lasting remainder of day. Moderate fatigue throughout this day. No further symptoms on subsequent days.</p>
11	DCS	-2	600	<p>24 Oct 45 No symptoms at 99 feet, on reaching 33 feet, while at 33 feet or on coming to surface. No itch or fatigue at any time. At 0400, on following A.M. (about 8 hours post dive) he was awakened from his sleep with pain in right knee located deeply over medial semilunar cartilage. Went back to sleep but awoke again at 0545 with severe pain. Recompressed at 0600 and treated as follows:</p> <p>L.S. - 0600 R-60' 0657 R-40' 0804 on O<sub>2</sub>  R-100' 0613 On O<sub>2</sub> 0702 L-40' 0834 on O<sub>2</sub>  L-100' 0643 L-60' 0732 Reached surface on O<sub>2</sub> 0839  R-80' 0644 R-50' 0733 on O<sub>2</sub>  L-80' 0656 L-50' 0803 on O<sub>2</sub></p> <p>On recompression, pain in knee was aggravated at about 10 feet of pressure. Recompressed very slowly. Obtained complete relief at 39 feet. No further symptoms during remainder of treatment or after treatment.</p>

13	DCS	-2	570	<p>29 Oct 45 No complaints at 33 feet. Came to surface feeling fine. No itch at any time. Only very slight fatigue. About 0030 (4 hours post dive) he began to feel stiffness in both knees. Turned in at 0100. Awoke at 0600 with severe pain in both knees (deep in back of patella). Walking aggravated this pain and his knees were stiff. Placed in chamber and given following treatment.</p> <p>L.S. 0619 R-120' 0718 L-80' 0756 R-40' on O<sub>2</sub> 0859  R-165' 0633 L-120' 0730 R-60' on O<sub>2</sub> 0757 L-40' on O<sub>2</sub> 0929  L-165' 0703 R-100' 0731 L-60' on O<sub>2</sub> 0827 R-30' on O<sub>2</sub> 0930  R-140' 0705 L-100' 0743 R-50' on O<sub>2</sub> 0828 L-30' on O<sub>2</sub> 1030  L-140' 0717 R-80' 0744 L-50' on O<sub>2</sub> 0858 R.S. on O<sub>2</sub> 1035</p> <p>On recompression, patient obtained relief of acute pain in right knee at 40 ft. and in left knee at 165 ft. Residual soreness remained throughout remainder of treatment. On emerging from chamber, right knee felt OK, left knee still had residual soreness which stayed with him for the remainder of the day. The following day he had no complaints. This subject also had a weekend of drinking and late hours. On Saturday, he went to bed about 2 A.M. and Sunday night at midnight with drinking on both nights. This may be responsible for his getting the bends.</p>
14	DCS	-2	420	<p>29 Oct 45 No complaints at 33 feet. Came to surface feeling fine. No itch at any time. No fatigue. Went to bed at 0030 feeling fine. At 0330 (7 hours post dive) woke up with severe pain in both knees located deeply beneath patellae. Right knee was worse than left. Remained in bed thinking the pain would pass off. At 0530, decided to get up to test legs. Found that he couldn't even go down the stairs. Woke up man on watch and walked into chamber with great difficulty (pain only - no paralysis). No other joint pains or other symptoms. Following treatment given:</p> <p>L.S. 0619  R-165' 0633 R-100' 0731 R-50' on O<sub>2</sub> 0828  L-165' 0703 L-100' 0743 L-50' on O<sub>2</sub> 0858  R-140' 0705 R-80' 0744 R-40' on O<sub>2</sub> 0859  L-140' 0717 L-80' 0756 L-40' on O<sub>2</sub> 0929  R-120' 0718 R-60' on O<sub>2</sub> 0757 R-30' on O<sub>2</sub> 0930  L-120' 0730 L-60' on O<sub>2</sub> 0827 L-30' on O<sub>2</sub> 1030 Reached surface on O<sub>2</sub> 1035</p> <p>On recompression, patient obtained relief of acute pain in left knee at 80 feet and in right knee at 148 feet. At 165 ft., all pain and soreness left his left knee. Residual soreness remained in right knee throughout entire treatment period, finally disappearing just before getting out of chamber. Emerged from chamber symptom free. No further recurrence. This subject said he was not in very good shape for his dive on Monday. Stayed up to 2 A.M. Monday A.M. and did quite a bit of drinking. The late hours and drinking on the night before his saturation dive may have been responsible for his getting the bends.</p>
16	DCS	0	60	<p>15 Jul 46 Sore throat for 24 hours. Pain in chest ("sore chest") on deep inspiration and/or coughing for two days. Had onset of "bends-type" pain in both knees within one hour following final surfacing, more pronounced in the right knee. These pains were mild, not severe enough for recompression, and bothered patient mostly during standing or walking. Duration: 24 hours, followed by stiffness in both knees for about one hour upon arising the day after completion of the dive.</p>
17	Marginal	0	60	<p>Sore throat and sore chest for two days following dive. Onset within one hour of final surfacing of migrating "bends type aches", mild and never staying in one location for more than a few minutes. Duration: 24 hours. No residual stiffness or soreness.</p>

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	eduas45	0.0	4	33.0	1440.0	2.0			15Oct45 Dive 1
2	eduas45	0.0	3	99.0	360.0	725.0			17Oct45 Dive 2
3	eduas45	1.0	1	99.0	360.0	725.0	1085.0	1153.0	17Oct45 Dive 2
4	eduas45	0.0	1	99.0	540.0	725.0			22Oct45 Dive 3
5	eduas45	0.5	1	99.0	540.0	725.0	1263.0	1415.0	22Oct45 Dive 3
6	eduas45	0.5	1	99.0	540.0	1085.0	0.0	0.0	22Oct45 Dive 4
7	eduas45	0.5	1	99.0	540.0	1085.0	1627.0	3065.0	22Oct45 Dive 4
8	eduas45	1.0	1	99.0	720.0	723.0	1445.0	1535.0	24Oct45 Dive 5
9	eduas45	1.0	1	99.0	720.0	723.0	1445.0	1535.0	24Oct45 Dive 5
10	eduas45	1.0	1	99.0	720.0	1445.0	2165.0	2285.0	24Oct45 Dive 6
11	eduas45	1.0	1	99.0	720.0	1445.0	2163.0	2765.0	24Oct45 Dive 6
12	eduas45	0.0	2	33.0	2160.0	2.0			29Oct45 Dive 7
13	eduas45	1.0	1	33.0	2160.0	2.0	2160.0	2732.0	29Oct45 Dive 7
14	eduas45	1.0	1	33.0	2160.0	2.0	2160.0	2582.0	29Oct45 Dive 7
15	eduas45	0.0	4	33.0	2160.0	2.0			31Oct45 Dive 8
16	eduas45	1.0	1	53.0	720.0	117.0	837.0	897.0	15Jul46 Dive 5
17	eduas45	0.5	1	53.0	720.0	117.0	837.0	897.0	15Jul46 Dive 5

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## **SECTION VI: SATURATION**

### **H. ASATDC**

- 23 dives: 8 DCS, 1 Marginal
- All dives were dry
- Dives were conducted during 1968 and 1969.
- Exercise: none recorded.
- Descriptions of the DCS manifestations and dive descriptions were obtained from dive log notes and medical records provided by Mr. Ron Nishi and Mr. Dave Eaton at the Defence and Civil Institute of Environmental Medicine in Toronto, Canada.

1. Kidd DJ, RA Stubbs and RS Weaver. Comparative approach to prophylactic decompression. In Underwater Physiology (IV), C.J. Lambertsen, Editor. Academic Press, New York & London, 1971, pp: 167-177

# SECTION VI: SATURATION

H. ASATDC 23 Dives: 8 DCS, 1 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms																																				
2	Marginal	-2.0	0	Start time 0826, 12 Nov 68 End time 0828, 13 Nov 68 Diver had varied minor bend symptoms from surfacing to 330 mins post dive. No treatment. At 0827 diver experienced slight pain right knee on surfacing for 5 mins and went away. Around noon, fleeting pain from arm muscles to leg muscles intermittently. At 1400 positive stiffness in 2nd joint right ring finger with pain, duration 15 mins then disappeared.																																				
4	DCS	120	240	Start Time: 0821, 18 Nov 68 End Time: 0822, 19 Nov 68 4hrs: soreness Right knee - back of knee - passed off - recurred medial aspect of right knee. 7hrs: pain (throbbing cramp) left achilles tendon. On examination: unable to support deep knee bends - lacks 30 flexion - lacks power to extend. Minimal pitting (?) oedema over medial aspect of right knee. Full passive movement reflexes. Treatment start time: 1630, 18 Nov 68      End Time: 1920      Bottom Depth: 165fsw Workman's Treatment Table <table><tr><th>Min</th><th>fsw</th><th></th></tr><tr><td>1</td><td>33</td><td>Right knee improved 5, 33 Left ankle relieved</td></tr><tr><td>7</td><td>33</td><td>Right knee improving 10.5, 33 Right knee relieved subjectively and objectively</td></tr><tr><td>20</td><td>60</td><td>(no notation)</td></tr><tr><td>33</td><td>60</td><td>no change 12 mins 60', slight soreness remains right knee</td></tr><tr><td>34.5</td><td>164</td><td>Complete relief on arrival at 165'</td></tr><tr><td>39.8</td><td>165</td><td></td></tr><tr><td>42</td><td>100</td><td></td></tr><tr><td>43.8</td><td>60</td><td></td></tr><tr><td>44.7</td><td>60</td><td>soreness, slight recurred</td></tr><tr><td>45.3</td><td>100</td><td>relief</td></tr><tr><td>50</td><td>100</td><td>trail ascent 10'/min</td></tr></table> Diver reported on reaching surface that he was symptom free except for slight stiffness right knee and that no change had occurred since leaving 60'. In retrospect, the DMO was sure that a recurrence probably occurred between 60' and reaching surface. By 0330 on 20 Nov 68 we were dealing with residual oedema. After treatment very slight pain with stiffness remained in right knee on deep knee bend. At 0300 (20 Nov 68) patient was awakened by throbbing in right knee. Painful on walking. Very painful when full weight is put on right leg. 0846 2nd treatment dive	Min	fsw		1	33	Right knee improved 5, 33 Left ankle relieved	7	33	Right knee improving 10.5, 33 Right knee relieved subjectively and objectively	20	60	(no notation)	33	60	no change 12 mins 60', slight soreness remains right knee	34.5	164	Complete relief on arrival at 165'	39.8	165		42	100		43.8	60		44.7	60	soreness, slight recurred	45.3	100	relief	50	100	trail ascent 10'/min
Min	fsw																																							
1	33	Right knee improved 5, 33 Left ankle relieved																																						
7	33	Right knee improving 10.5, 33 Right knee relieved subjectively and objectively																																						
20	60	(no notation)																																						
33	60	no change 12 mins 60', slight soreness remains right knee																																						
34.5	164	Complete relief on arrival at 165'																																						
39.8	165																																							
42	100																																							
43.8	60																																							
44.7	60	soreness, slight recurred																																						
45.3	100	relief																																						
50	100	trail ascent 10'/min																																						

4 (cont)					64 min, 30 fsw -- examined: no essential change - perhaps less inhibition of extension. Subjectively says symptoms worsened slightly on arrival at 60' - much worse at 165' - some recovery on return to 60' - slightly better at 33'. No indication of cavitation - dealing with residual oedema - no further indication of pressure therapy at this time.																					
6	DCS	30	150		Start time: 1215, 20 Nov 68 End time: 1216, 21 Nov 68 2.5 hrs post dive - transient pain right knee - this passed off, 8 hrs after - ache right knee and left ankle; sit ups - full flexion but painful. <i>Treated on same treatment dive as Profile #7 below (DD0774T) - relief at 165'</i>																					
7	DCS	120	360		Start time: 1215, 20 Nov 68 End time: 1216, 21 Nov 68 1800 hrs general malaise (mild) slight chill; slept well until 2000 hrs, felt good; 2020 hrs walked to Car Club - mile - felt poor again - slight nausea; 2100 hrs (approx) called other diver from this dive ( <i>Profile #6 above</i> ) - pain right knee, small macular rash, dusty - no oedema. Pale, slight sweating, no glands. Treatment: <table><tr><td>Min</td><td>fsw</td><td></td></tr><tr><td>4</td><td>33</td><td>no change</td></tr><tr><td>8</td><td>60</td><td>niggles wrists and shoulders</td></tr><tr><td>11</td><td>60</td><td>no real change</td></tr><tr><td>23</td><td>165</td><td>no pain or niggles</td></tr><tr><td>57</td><td>60</td><td>feels much better, no pains</td></tr><tr><td>143</td><td>0</td><td>surface well.</td></tr></table>	Min	fsw		4	33	no change	8	60	niggles wrists and shoulders	11	60	no real change	23	165	no pain or niggles	57	60	feels much better, no pains	143	0	surface well.
Min	fsw																									
4	33	no change																								
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11	60	no real change																								
23	165	no pain or niggles																								
57	60	feels much better, no pains																								
143	0	surface well.																								
9	DCS	-1.0	10		Start time: 0806 18 Dec 68 End time: 0807 19 Dec 68 10 mins post dive - transient ache left elbow 30 mins post dive - puritis legs and arms - no signs 4 hrs post dive - puritis left lower chest and abdomen - skin signs, pain left wrist, weakness right knee. At 1215 hrs complained of itchiness left flank with bluish discoloration. 20 mins later, pain left wrist and weakness right knee. On examination, marked weakness of extension of right knee with hyperparasthesia lat. calf. No wrist weakness but wrist pain aggravated by flexion. Relief 11 mins at 33' ( <i>treatment dive DD0790C</i> ).																					
10	DCS	30	150		Start time: 0806 18 Dec 68 End time: 0807 19 Dec 68 2.5 hrs post dive presented with pain left shoulder. On examination questionable inhibition of extension power. Symptoms aggravated by arm raising, worse at about 90°. No glands palpable - no skin signs. Pain left deltoid (distally) 1045 hrs. erythema, no discoloration. Treated at 1127, 19 Dec 68 (DD0790B) 2.5 mins, 33' complete relief of subjective symptoms. No recurrence.																					
11	DCS	30	263		Start time: 0806 18 Dec 68 End time: 0807 19 Dec 68 Niggle left ankle at 10:00. Pain right knee at 12:30. No associated weakness or loss of sensation. Niggle left little toe. Relief 2.5 mins at 33' on DD0790C																					

13	DCS	10	34	<p>Start time: 0940, 20 Jan 69 End time: 0941, 21 Jan 69</p> <p>First noticed left leg "dragging" while walking about 10:15 21 Jan 69. Heavy feeling followed by ache left buttock and upper left thigh. No other complaints. On examination all normal except for slight left quadriceps weakness, and reflexes K &amp; A reg. bilateral and normal. No sensory loss, walking well but complains of "heavy leg". Unstable standing on left leg only. Just prior to treatment, ache became more evident. This disappeared by 2 mins at 30 fsw on O<sub>2</sub> and all subjective symptoms gone by 7 mins.</p> <p><i>Other note parenthetically adds:</i> (1030 niggle left leg, soreness in left hip. 1100 hrs examined by DMO and definite loss of power in left leg. Treatment dive at 1122 hrs. Complete relief at 1130 hrs) Treatment dive DD0798B</p> <p>Start time: 1122 End time: 1233 30 fsw / 40 mins Total dive time 70 mins</p>
15	DCS	30	69	<p>Start time: 0836, 22 Jan 69 End time: 0851, 23 Jan 69</p> <p>Gradually increasing discomfort in left shoulder and upper arm since about 10:00 hrs. Pins and needles in left little finger. On examination: no rash, no tenderness, no weakness, reflexes bilateral and equal, no sensory loss.</p> <p><i>Additional note:</i> 75 mins post dive, discomfort left shoulder Treatment DD0799B, Start time: 1237 hrs, 23 Jan 69 End time: 1350 (same day) Complete relief 33 fsw / 9 mins.</p>



Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	asatdc	0.0	2	26.4	1440.0	2.0			DD0766A
2	asatdc	0.5	1	26.4	1440.0	2.0	1440.0	1442.0	DD0766A
3	asatdc	0.0	3	26.4	1440.0	1.0			DD0770A
4	asatdc	1.0	1	26.4	1440.0	1.0	1561.0	1681.0	DD0770A
5	asatdc	0.0	1	33.0	1440.0	1.0			DD0774A
6	asatdc	1.0	1	33.0	1440.0	1.0	1471.0	1591.0	DD0774A
7	asatdc	1.0	1	33.0	1440.0	1.0	1561.0	1801.0	DD0774A
8	asatdc	0.0	4	26.4	1440.0	3.0			DD0775A
9	asatdc	1.0	1	33.0	1440.0	1.0	1440.0	1451.0	DD0790A
10	asatdc	1.0	1	33.0	1440.0	1.0	1471.0	1591.0	DD0790A
11	asatdc	1.0	1	33.0	1440.0	1.0	1471.0	1704.0	DD0790A
12	asatdc	0.0	2	26.4	1440.0	1.0			DD0798A
13	asatdc	1.0	1	26.4	1440.0	1.0	1451.0	1475.0	DD0798A
14	asatdc	0.0	2	33.0	1454.0	1.0			DD0799A
15	asatdc	1.0	1	33.0	1454.0	1.0	1485.0	1524.0	DD0799A

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## SECTION VI: SATURATION

### I. ASATFR85

- 21 dives: 0 DCS, 0 Marginal
- All dives were dry
- Exercise: not known

1. Masurel, G. Air saturation at shallow depth. In: DJ Smith and DCB Holt, editors. Proceedings of the 4th Tripartite Submarine Medical Conference, Alverstoke, United Kingdom, 1985.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	Data Set Notations
1	ASATFR	0.0	6	22.97	2160.0	2.0	"7 meters"
2	ASATFR	0.0	6	26.25	2160.0	2.0	"8 meters"
3	ASATFR	0.0	1	29.53	2160.0	2.0	"9 meters"
5	ASATFR	0.0	8	29.53	2160.0	2.0	"9 meters with O <sub>2</sub> last 2 hrs"

**VIII. Surface  
Decompression (Air)**

## SECTION VII: SUB-SATURATION

### A. EDU849S2

- 60 dives: 13 DCS, 17 Marginal
- All dives were dry
- Dives were conducted during April - June 1945
- Exercise: none during the dive. After surfacing "half of the group was then exercised for the next 2 hour period while the other half rested in bed."

*"The exercise prescribed consisted of lifting and returning a 25 pound dumbbell with both hands from a bench 12 inches high to arms length overhead at a rate of 4 times each minute for the entire two hour post dive period. The method of lifting this weight was alternated each minute to distribute the work load of different muscle groups. During one minute the weight was lifted by keeping the knees stiff, thus exercising chiefly the muscles of the back and upper extremity. During the alternate minute the weight was lifted and lowered by extending the flexing the knees from and to a squatting position, thus chiefly exercising the lower and upper extremities and keeping the back fairly erect."*

- Descriptions of the DCS manifestations were taken from the dive logs and cross referenced with reference 1.
- Diagnoses of DCS were initially made by Dr. Van der Aue as seen in ref (1). With the additional information from the dive logs, re-diagnoses were made in March 1997 using the criteria established by Weathersby in 1988 (appendix A). The re-diagnoses were made by collective decision of the following:

CDR Charles Auker MC USN  
LCDR Robert Ball MC USNR  
LCDR Charles Toner MC USN  
LCDR Daniel Valaik MC USN  
LT Thomas Buttolph MC USN  
Edward T. Flynn MD (MC USN RET)

1. Van Der Aue, O.E., R.J. Kellar, and E.S. Brinton. The Effect of Exercise During Decompression from Increased Barometric Pressures on the Incidence of Decompression Sickness in Man. Navy Experimental Diving Unit Report #8-49, March 1949.

## SECTION VII: SUB-SATURATION

A. EDU849S2

60 Dives: 13 DCS, 17 Marginal

Profile #	Outcome	Exercise Status	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
3	Marginal	work	120	672	no complaints. This subject exercised but noticed no ill affects therefrom except on following day he had mild back soreness (erecto spini muscle group). On day of run about 8 p.m. said he thought he felt a slight dull pain in back of his right shoulder which lasted about 5 mins. No further complaints except moderate fatigue toward evening of day of run.
4	Marginal	rest	120	600	no complaints. Noticed only moderate fatigue toward evening on day of run.
5	Marginal	rest	0	30	Mild bends. About 1/2 hour after his dive subject noticed his first symptoms of pain deep in his right wrist which lasted about 5-10 minutes and disappeared. This pain would recur and disappear throughout the remainder of the day, probably on the average of once an hour but never lasting more than about 5 mins. Still noticed it at times on evening of the 26th (made dive nite of 25th). At about noon he noticed a pain in his left elbow which lasted about 5-10 minutes and disappeared. This recurred once or twice afterward but finally gave him no further symptoms toward late afternoon. About 3 p.m. he noticed a definite pain in his right big toe which lasted from 5-10 mins which disappeared without further recurrence. Toward evening subject developed a headache over the eyes (frontal area) which lasted 3-4 hours. This was gone on following day (27th). Fatigue was quite severe on day following dive and even remained during morning of the 27th. Did not feel completely normal until about noon on the 27th. No skin itch was ever present following this dive.
6	Marginal	work	120	540	no complaints (mild bends?). This subject worked following his dive. Had no complaints during this period or afterward. About 6 p.m. of this day he said he noticed transient mild dull aching pains travel up and down both arms, from shoulder to wrist which intermittently were noticed until about midnite. Said he noticed one slight twinge of pain in right ankle but this was barely noticeable and disappeared within 5 mins. None of these complaints were either severe or permanent. Said he had a slight headache at 10 p.m.. However, he slept very well that evening. Following day no complaints except soreness of his back muscles (erecto-spini muscle group) probably from the effects of exercise. His other complaints may have been due to this exercise. This is a borderline case. On day after dive subject did not complain of any fatigue. This case is therefore classified as a "no complaint" dive. [this last sentence was crossed out and followed by:] Re evaluated 4/16/47 considered a case of mild bends.
8	Marginal	rest	120	510	Mild bends. About 1/2 hour after dive developed skin itch (no rash) over volar aspect right forearm and also along inner side of right thigh above the knee. Itching was quite intense and localized. This subject smoked immediately after dive. Itch lasted about 3 hours, finally disappearing. About 1700 subject noticed a dull pain in right shoulder only when he lifted his arm. This was noticed on one or two occasions and then disappeared without further annoyance. Remainder of day uneventful. No fatigue.

9	DCS	rest	120	555	<p>Mild Bends. No complaints after surfacing. About 6 p.m. on Friday (soak made Thurs nite) he noticed a dull aching pain in both ankles, very mild in character. Said it felt "deep in the bone" and localized them in the malleoli. Noticed these mild pains all evening until retiring at midnite and awoke Saturday a.m. feeling fine. Subject did not have a headache following this dive as he did on his previous 35 foot dive. However, about 11 a.m. on Saturday he said he noticed a fleeting pain travel from his right shoulder to his elbow, lasting about 1 min and disappearing. Following this he noticed fleeting pains in other parts of his body as in his left thigh and left arm. All momentary and mild. He went to bed Saturday afternoon noticing these slight symptoms which soon disappeared during the afternoon. No fatigue or skin itch.</p>
10	DCS	rest	10	60	<p>Bends. About 1 hour after surfacing this subject noticed a dull pain develop over his left wrist (volar aspect over medial portion of radial head - the radial pulse area) with slight swelling noticed some afterward. Movement of wrist and forearm aggravated this pain, becoming quite sharp. Occasionally traveled up forearm toward elbow. Subject carefully (???) and pains subsided and disappeared by noon (3.5 hrs after dive). About 3 p.m. (6.5 hrs after dive) pain returned to wrist and forearm. Remained until he was recompressed at 1651 (8 hrs 18 mins after dive). No relief under pressure but felt a little better @ 165 ft. Pain gradually diminished at this depth and completely disappeared in 20 min at this depth. Brought out as follows: L.S. 1651 Reach 165 @ 1700 (4 min @ 100 no relief)  165 for 30min (relief after 20-25 min)  140 12 min 120 12 min 100 12 min 80 12 min  60 30 min 50 30 min 40 30 min 30 60 min  Surfaced 5 min @ 2101 [60' stop through surface Pt was breathing oxygen] Felt well after Rx except moderate fatigue. At about 2200 said he noticed two twinges of sharp pain in right forearm, noticed within a minute but all symptoms disappeared without recurrence. No further complaints.</p>
11	DCS	work	30	135	<p>Bends. This subject exercised. No complaints during this 2 hour period but about 15 min after completing exercise, he developed a dull ache in area around right knee, chiefly along medial aspect of tibial head and (???) of femur and the medial ligaments. This occurred about 1100 and persisted until given Rx @ 1347. Under recompression definite relief was noticed @ 30 feet and complete relief attained @ 40 feet. Following Rx given: L.S. @ 1347. R. 100 @ 1352 30 min 80' - 12 min 60' - 30 min 50' - 30 min 40' - 30 min Surface 5 min @ 1613 [Pt breathing oxygen from 60' stop to surface] No further complaints except mild fatigue.</p>
13	Marginal	rest	120	250	<p>no complaints (borderline). this subject had no joint pains but about 1 pm felt a stiffness present in back of both knees and felt like the muscles along the longitudinal area of his right foot along its medial aspect had cramplike symptoms with stiffness. This stiffness of knees and arch remained constant but of low intensity. Lasted to about 6 p.m. before disappearing. Slight fatigue was noticed during day following dive. No skin itch was ever noticed. Felt well on the 11th (dive made nite of 9th)</p>
14	Marginal	rest	-1.5	0	<p>Mild bends. During the two hours after his dive, this subject noticed slight fleeting pains of momentary character involving chiefly the right wrist and left knee (patellar tendon area). Also had a transitory pain in the left temporo mandibular joint area. None of the transitory pains remained constant, appearing possibly for a minute or two, disappearing and then recurring. These fleeting pains completely disappeared after about 3 hours after dive without further recurrence. Subject did not feel fatigued after his dive nor on the following day. There were no symptoms of skin itch or rash.</p>

15	Marginal	rest	30	150	Mild bends. Subject had no complaints until about 2.5 hrs after his dive when he noticed some pain deep in his right wrist. This lasted about 3-4 min and then disappeared. This pain recurred and disappeared during the course of the day, never more nor remaining longer than 5 min - probably recurring about once each hour. Intensity and frequency of this pain was most noticeable during the 1st hour after its onset. (This patient's right wrist was also involved after his 35 foot dive - see ante). Even following a.m. (11th) he noticed some residual soreness and stiffness in this wrist. At about noon of day following dive (10th) an additional complaint was a slight pain in the quadriceps tendon of his right knee. This lasted about 10-15 min and disappeared without recurrence. Mild fatigue was present during day following dive but much less than that present following his 35 foot dive (see ante). Subject says he felt better after this 38 foot dive than he did following the 35 foot dive ( <i>sic</i> ). No skin itch at any time. Following day (11th) felt well except for some residual stiffness that later disappeared from his right wrist.
16	Marginal	work	30	120	Mild Bends. After 2 hours of work exercise this subject noticed mild transitory pains in his left shoulder and both knees coming on at intervals and never lasting more than 5-10 mins at a time. The frequency and intensity of these pains were most noticeable during the hour after the exercise (2-3 hours after dive). The shoulder soon became symptomless but the knee soreness and stiffness alternately came on and disappeared gradually fading away at about 6 p.m. The pains lasted the longest in his right knee which was the last joint involved. Moderate fatigue was present throughout the day. Did not sleep well during the dive. Felt well the following day (11th). No skin itch at any time.
17	Marginal	work	-1.5	0	Mild Bends. This subject developed a mild pain situated deeply in left shoulder which came on during his exercise period following his dive. The pain was of dull aching intensity which came & went periodically. When asked when this pain was most severe or constant, patient thought he noticed it most during the first hour of exercise (immediately after dive) and then the pain was not severe or disabling. The dull ache lasted throughout the day, finally disappearing about 9 p.m. that day. This subject has what is presumed to be a chronic bursitis of left shoulder which usually gives him trouble after dives. During 1st hour after dive (during exercise) subject had mild skin itch (no rash) over both shoulders lasting about 5 min and disappearing without recurrence. Fatigue was quite moderate during early afternoon. Subject spent the afternoon at rest in the bunk and on arising in the late afternoon, fatigue disappeared. He felt fine except for the dull shoulder ache. Day following dive subject felt well. On 2nd day after dive which was rainy and cold, the dull ache of his bursitis reappeared.
18	Marginal	work	0	30	no complaints. (borderline). During exercise period this subject noticed mild fleeting pains of momentary character, barely noticeable predominantly affecting the right arm and left knee. Disappeared before 2 hour exercise period was completed without recurrence. No other complaints except moderate fatigue toward evening. Slept well that evening and felt well following day. No skin itch. [later notation:] re-evaluated 4/16/47 considered a case of mild bends.
20	Marginal	work	-1.6	10	No complaints. (borderline) About 10 minutes after coming up and while beginning to work, intense itch appeared across upper back and arms. This lasted about 45 mins before it finally disappeared. No rash. No post dive pains of any sort. Fatigue was quite severe in mid afternoon. When he went home he took a hot bath and fatigue eased off. Fatigue was not due to a restless nite in the chamber as he states he slept very well during his dive. No complaints on following day.



21	DCS	rest	0	360	Mild Bends. This subject experienced the worse case of skin itch he's ever had before from any of his dives. Came on about 10-15 min after coming to the surface. It was localized in both legs, mostly below knee level. Some itch was present over lower back. No rash appeared any place and itch finally disappeared about noon. In the early afternoon he noticed a feeling of stiffness over the front part of his right thigh and in the right groin. Also noticed a mild ache below both knee caps when he walked of climbed stairs. The stiffness of his thigh eased off about 5 p.m. and the dull ached of both knees became less noticeable but lasted through the evening. Slept well that evening and awoke the next day feeling fine. There was no post dive fatigue.
22	DCS	rest	120	600	Mild bends. About 30 min after completing dive his thighs began to itch which traveled up his back and by noon was present over nape of neck. Itch finally disappeared by 2 p.m. About 6:30 p.m. he noticed a mild ache developed in his left knee over its medial and posterior aspect. Ache was of very mild nature and did not become any worse that day. Mild post dive fatigue was noticed that day. Following day, the mild ache in his knee persisted and was noticed whether he was at rest or using his leg. On 2nd day after dive and even 3rd day afterward, he still noticed a very slight residual ache in that knee.
23	Marginal	rest	10	60	Mild Bends. 1 hour after coming to surface this subject noticed a dull pain in the adductor and flexor muscle groups of his right thigh distally just below the back and medial part of his right knee. The pain was not constant, coming on for approximately 15 min and then disappearing the following 1/2 hour. This lasted from 9 a.m. to about 5 p.m. being most severe about 11 a.m. No itch. no fatigue - felt sleepy during entire day following dive although he slept well in the chamber on the previous nite.
24	Marginal	rest	0	180	Mild Bends. About 10 minutes after coming to surface, moderate skin itch developed over shoulders, upper back and upper chest, lasting about 20 mins and disappearing without recurrence. No rash developed. About 1100, subject noticed an inconstant, dull pain, come on and disappear intermittently in posterior position of his right ankle in Achilles area. The ache was aggravated on weight bearing. Came and disappeared several times and completely disappeared at about 1200 without further recurrence. Fatigue was very severe in this case. Began about 1530 getting into his car to go home at 1630 he said he felt so tired "he could have laieh done (sic) on the concrete pavement and fallen asleep". Fatigue continued throughout early evening and did not disappear until about 2000 following a hot bath when he finally "snapped out of it". Slept very well that nite. Felt well the following day. Fatigue was not due to any lack of sleep in the chamber on the nite of his dive as he states he slept well while under the pressure.
25	DCS	work	10	660	Mild bends. This subject made a work run following his dive for a 2 hour period. After about 40 minutes of work he developed a pain in the metacarpophalangeal joint of his left 4th finger which lasted about 15 min and then disappeared. This was followed by extension of pain into his right wrist and a simultaneous pain in the patellar ligament of his right knee. Both these pains lasted about 1/2 hour and then disappeared. These pains all came on during his 2 hr exercise period and were gone by the time the 2 hr work period was completed. Had no further pains until about 7 p.m. when a return of pain was noted in same location of the right knee. The pains were more severe than they were in the a.m. Said it felt as though his knee would "buckle under" him when standing on it. The dull ache was definitely aggravated by weight bearing. This pain lasted up to the time he turned in and was gone the following a.m. No itch. Slight fatigue was noticed on day following dive. On 2nd day following dive, he noticed slight soreness of his back muscles presumably from the effect of stretching from exercise. (this was subject's first work run in this project).

26	DCS	work	30	90	Mild Bends. After about 1.5 hours of working following his dive, this subject developed pain in his right patellar tendon. He did not think it severe enough to require recompression. Completed his 2 hour work run and the pain diminished. Slight pain recurred inconstantly throughout the day - noticeable in the afternoon upon weight bearing on that leg. All pains finally disappeared about 7 p.m. No itch. Slight post dive fatigue. The following day he felt well except for slight aching muscles in back of both legs and in erector-muscle group of back probably from the unusual exercise done the previous day.
27	Marginal	work	0	720	Mild Bends. This subject developed slight skin itch over his arms and legs soon after coming out of chamber which lasted about 1/2 hour during the early part of 2 hour work period. Mild post dive fatigue was noticed in the afternoon but this he attributed to the fact that he did not sleep well in the chamber during his run; About 8 PM that nite he developed a pain in his left wrist which was of moderate intensity. He was prepared to report to EDU for recompression therapy but the pain disappeared in about 5 mins without further recurrence. No other complaints.
28	Marginal	work	0	900	Mild Bends. This subject developed generalized skin itch very soon [10 min] after dive involving mostly the forearms. Itch was quite severe at first but gradually became of less severity and disappeared about 1 hour after his exercise period (3 hrs after completing dive). This was accompanied by a feeling of "crawling bubbles" or formication over the shoulders and arm. Had no further complaints. After seeing a movie at nite and on his way home about 11 p.m. that nite he developed a dull pain in the right upper border of the trapezius muscle over shoulder. Lasted about 5 min and was preparing to come to EDU for recompression therapy when it disappeared and never recurred. No post-dive fatigue was present. On following day (5/30) he also had mild substernal soreness which noticed in the afternoon but which disappeared by that evening. No further complaints.
29	Marginal	work	120	360	Mild bends. this subject developed a slight pain inside of his right knee joint about 2 p.m. on day following dive. The pain was not continuous but was noticed at periodic intervals for 2.5 hours after its onset and was particularly more noticeable on weight bearing. Disappeared after 2.5 hours and was followed by a pain in his right metatarsal area (near instep) also aggravated by weight bearing. This lasted about 1/2 hour and then disappeared. No skin itch. Slight fatigue after dive - slept well in chamber and at home the following nite.
30	DCS	rest	30	120	Bends. About 1015 this subject noticed a mild pain in his left wrist which traveled up to his left forearm muscles, (???) over medial aspect of forearm. This pain felt "deep" and was not too severe but just annoying. At the same time his little finger of that hand flexed and he couldn't extend it. Then his left hand began to feel cold. Reported to M.O. the left hand felt definitely colder than the right. Recompressed and treated as follows: LS 1046 Reach 100; 1051 30 min 80 12 min 60 30 min 50 30 min 40 30 min Surface in 5 min at 1312 [breathing oxygen from 60' stop through 5 min at surface] Relief was obtained at 12 feet. Had no further recurrence after Rx. No itch was ever present. No fatigue noticeable.

31	DCS	work	10	60	<p>Bends. This subject completed his dive at 0814 to be followed by a 2 hour work period. Began work about 0825 after necessary blood data was obtained. About 0915 (one hour after dive or about 50 minutes after work was begun) he developed a fairly sharp, steady pain in postero-medial region of right knee where the medial hamstring tendons insert into tibial head. He kept at work but the pain remained persistent and became gradually worse. Was put in the recompression chamber at 0936 and obtained complete relief at the 10 foot level. Taken to 100 feet and decompressed as follows:</p> <p>L.S. 0936 reached 100 feet 0940 remained 30 min  80 feet 12 min  60 feet 30 min  50 feet 30 min  40 feet 30 min  reached surface @ 1201 in 5 min <i>[breathed oxygen from 60' to surface]</i>  Had no recurrence of pain but did feel a little nauseated after coming out from Rx chamber. This lasted about 1.5 hours afterward and he felt OK after getting something to eat. No further symptoms except on following a.m. (5/23) he felt a residual soreness in the same knee but it promptly disappeared after walking about and never recurred after playing 36 holes of golf that day. There was no post-dive itch at any time. There was no post-dive fatigue at any time.</p>
32	DCS	work	120	360	<p>Bends. Subject had no complaints during his 2 hour work period following the dive. Began to itch about 10 a.m. mostly over area of lower back and inner aspects of thighs (saddle area). Itch remained about 4 hours before disappearing. No rash appeared. Soon after his itch disappeared he noticed both his knees felt stiff when he walked. No pain appeared until about 5 p.m. when a sharp pain developed in the right patellar tendon along with the stiffness but the pain lasted only about 5 mins and disappeared. At 6:30 p.m. he noticed that he felt a little numb around the right knee, slight swelling was noticed around the patellar ligament and the pain again reappeared. The pain was most noticeable on putting a strain on the patellar ligament as by sharply flexing his leg or walking upstairs. Came to EDU for Rx. Pressure applied @ 1940 and taken to 165 feet. Slight relief was obtained only after about 20 min at the depth. Slight soreness remained for the remainder of Rx. Rx given as follows :</p> <p>L.S. @ 1940 reached 165 @ 1950 remained 30 mins  140 feet 12 mins 120 feet 12 mins 100 feet 12 mins  80 feet 12 mins 60 feet 30 min 50 feet 30 mins  40 feet 30 mins 30 feet 60 mins Surface @ 2351 in 5 mins  <i>[breathed oxygen from 60' to surface]</i></p> <p>Still had residual soreness and very slight localized edema (slight) on emerging from chamber. Hot packs were applied. Following day slight residual soreness remained in A.M. but he played 18 holes of golf which made him feel better. Only slight soreness was noticed after his game. On the following A.M. no further symptoms were present. There was no post dive fatigue following this dive.</p>

33	DCS	work	10	60	<p>Bends. About 1 hour after his dive during the work period, this subject developed pain in the left patellar tendon. Continued work. The pain lasted about 10-15 mins and then disappeared even though his work was continued for the required 2 hour period. After his work he felt well. There was never any itch nor was he fatigued during the day. About 7 p.m. while in a movie he noticed a return of the pain in his left patellar tendon and also a pain developed in his right elbow, just distal to the medial (<i>epi??</i>) in the attached tendons. Both pains were moderately severe and constant. They remained until he thought he out to be recompressed. Came to EDU and was recompressed at 2324 (about 15 hours after dive). Given following Rx: L.S. 2324 reached 165 2335 30 min</p> <p>140 feet 12 min 120 feet 12 min 100 feet 12 min 80 feet 12 min 60 feet 30 min 50 feet 30 min 40 feet 30 min 30 feet 30 min Reached surface in 5 min at 0343</p> <p><i>[breathing oxygen from 60' to surface]</i></p> <p>When put under pressure he noticed partial relief at 165 in his elbow but no change occurred in left knee. Residual soreness remained in both places throughout the Rx period and came out with slight soreness still present both sites. Slept well that nite. Following a.m. residual soreness still present in elbow and knee lasting throughout the day. On 2nd day after dive his knee left perfectly normal and only very slight residual soreness remained in right elbow. No itch following dive. No fatigue was noted following dive.</p>
34	DCS	work	30	120	<p>Bends. This subject worked after his dive and immediately after his 2 hour work period he noticed a definite pain in the flexor tendons of his left thigh extending from his knee and shooting up toward his hip. Did not improve and after about 20 minutes he was recompressed at 1040. Obtained partial relief at 33 feet and complete relief at 45 feet. Then to 100 feet and treated as follows:</p> <p>L.S. 1040 reached 100 feet @ 1044 30 min 80 feet 12 min 60 feet 30 min 50 feet 30 min 40 feet 30 min surface 5 min @ 1322</p> <p><i>[breathing oxygen from 60' on to 5 min at surface]</i></p> <p>About two hours after surfacing (1530) he noticed a returned of a mild ache in the tendons of the back of his thigh. This came and went, lasting about 2 hours and then gradually disappearing about 7 p.m. Mild muscle soreness was present in back of both his legs in the evening feeling as if that was the result of the exercise prescribed. Felt OK the following day. No itch. Moderate fatigue was present during late afternoon and evening of day following dive.</p>

35	DCS	work	120	225	<p>Bends. This subject completed his two hour work period following the dive without any complaints. About noon he developed a dull ache below and in back of his left knee in an area where the gastrocnemius originates. The ache remained steady and became moderately severe and persisted up to the time when recompression treatment was instituted. Walking served to relieve it some but it was more noticeable while resting or lying down. Since it felt to him as though it wouldn't go away, he was put under pressure at 1438 and treated as follows: L.S. 1438 reached 100 feet 1440 30 min 80' 12 min 60' 30 min 50' 30 min 40' 30 min reached surface @ 1701 within 5 min [breathing oxygen from 60 to surface] Relief was prompt at 30 feet level during recompression. No recurrence. Felt fine on emerging from treatment chamber. No itch was noticed following this dive. No fatigue was present following this dive. On second day after dive (5/25) subject's back felt a little stiff presumably from the effects of the exercise but otherwise there were no other post-dive complaints.</p>	
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Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	edu849s2	0.0	8	33.0	720.0	1.3			None
2	edu849s2	0.0	4	35.0	720.0	1.4			
3	edu849s2	0.5	1	35.0	720.0	1.4	841.4	1393.4	
4	edu849s2	0.5	1	35.0	720.0	1.4	841.4	1321.4	
5	edu849s2	0.5	1	35.0	720.0	1.4	721.4	751.4	
6	edu849s2	0.5	1	35.0	720.0	1.4	841.4	1261.4	
7	edu849s2	0.0	4	37.0	720.0	1.5			
8	edu849s2	0.5	1	37.0	720.0	1.5	721.5	1231.5	
9	edu849s2	1.0	1	37.0	720.0	1.5	841.5	1276.5	
10	edu849s2	1.0	1	37.0	720.0	1.5	731.5	781.5	
11	edu849s2	1.0	1	37.0	720.0	1.5	751.5	856.5	
12	edu849s2	0.0	2	38.0	720.0	1.5			
13	edu849s2	0.5	1	38.0	720.0	1.5	841.5	971.5	
14	edu849s2	0.5	1	38.0	720.0	1.5	720.0	721.5	
15	edu849s2	0.5	1	38.0	720.0	1.5	751.5	871.5	
16	edu849s2	0.5	1	38.0	720.0	1.5	751.5	841.5	

17	edu849s2	0.5	1	38.0	720.0	1.5	720.0	721.5
18	edu849s2	0.5	1	38.0	720.0	1.5	721.5	751.5
19	edu849s2	0.0	12	40.0	720.0	1.6		
20	edu849s2	0.5	1	40.0	720.0	1.6	720.0	731.6
21	edu849s2	1.0	1	40.0	720.0	1.6	721.6	1081.6
22	edu849s2	1.0	1	40.0	720.0	1.6	841.6	1321.6
23	edu849s2	0.5	1	40.0	720.0	1.6	731.6	781.6
24	edu849s2	0.5	1	40.0	720.0	1.6	721.6	901.6
25	edu849s2	1.0	1	40.0	720.0	1.6	731.6	1381.6
26	edu849s2	1.0	1	40.0	720.0	1.6	751.6	811.6
27	edu849s2	0.5	1	40.0	720.0	1.6	721.6	1441.6
28	edu849s2	0.5	1	40.0	720.0	1.6	721.6	1621.6
29	edu849s2	0.5	1	40.0	720.0	1.6	841.6	1081.6
30	edu849s2	1.0	1	40.0	720.0	1.6	751.6	841.6
31	edu849s2	1.0	1	40.0	720.0	1.6	731.6	781.6
32	edu849s2	1.0	1	40.0	720.0	1.6	751.6	1081.6
33	edu849s2	1.0	1	40.0	720.0	1.6	731.6	781.6
34	edu849s2	1.0	1	40.0	720.0	1.6	751.6	841.6
35	edu849s2	1.0	1	40.0	720.0	1.6	751.6	946.6

## **SECTION VII: SUB-SATURATION**

### **B. NSM6HR**

- 57 dives: 3 DCS, 2 Marginal
- All dives were dry
- Dives were conducted during 1989 and 1991
- Exercise: at depth on a bicycle ergometer; workload of 100 watts; 30 minutes work / 30 minutes rest cycle for four exercise periods (2 hr total).
- Descriptions of the DCS manifestations were taken from reference 1.

1. Decompression Sickness Resulting from Long Shallow Air Dives. CL Shake, PK Weathersby, D. Wray and EC Parker. NSMRL Report 1200, Naval Submarine Medical Research Laboratory, Groton, CT. May 1996.

## SECTION VII: SUB-SATURATION

### B. NSM6HR

57 Dives: 3 DCS, 2 Marginal

Profile #	Outcome	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
10	Marginal	120	600	10 hrs after surfacing, fleeting minor pain right wrist & left elbow that was not sustained or well defined; all Sx resolved by 16 hrs post-dive without Tx.
13	DCS	121	3901	Approx 2 hrs after surfacing developed severe throbbing left retro-orbital pain; Hx of cluster headaches, usually precipitated by alcohol & fatigue, this was not different from those previously experienced; headache resolved < 3 hrs. 65 hrs post-dive, noted sudden onset of left hip pain, much worse with weight bearing; "deep seated, within the hip joint"; no Hx of recent trauma or hip pain; pain progressed over a 1-2 hr period until subject was unable to bear weight on left leg (10/10); no other c/o; no erythema or swelling; slight tenderness with palpation of greater trochanter; range of motion was limited, especially abduction & extension; strength was decreased 2° to pain; sensation was intact - deep tendon reflexes in legs were 3+ and equal bilaterally; x-ray of hip was normal; neuro was normal. Subject was compressed to 60 fsw, pain decreased (5/10) after first 20 min O <sub>2</sub> period; Sx continued to decrease and essentially resolved after 5 O <sub>2</sub> periods @ 60 fsw. TT6 was completed; upon surfacing mild residual left hip soreness; slowly resolved over the next 3-5 days.
16	DCS	10	65	Right shoulder pain reported approx 1 hr 5 min after surfacing; poorly localized 2/10 increased to 3/10 during first mins of exam, then gradually decreased. 2 hrs 20 min after surfacing subject was treated on TT6; after the 2nd O <sub>2</sub> period @ 60 fsw subject reported a prior fleeting left shoulder pain the occurred during pressurization but resolved quickly at approx 25 fsw; Px also reported being free of Sx after this time; TT6 was completed, no residual problems.
18	DCS	-0.7	220	2 hr 10 min post dive c/o mild left posterior knee stiffness that has started approx 10 min after surfacing but not progressed; also c/o minor neck "stiffness". Exam of left knee, left leg & neck were normal. Approx 3.5 hr after surfacing subject noted dull pain in left hand between 4th & 5th metacarpal; also described dull pain in left triceps and trapezius; neck discomfort persisted and intermittently radiated to left arm; other Sx include transient left ankle and foot pain, brief periods of light-headedness & short episodes of a "cold, clammy feeling all over"; these other Sx resolved prior to treatment. 5 hrs post dive c/o only of pain in left hand, triceps & trapezius (2/10); neck stiffness persisted; neuro exam was normal. Dx of neurological DCS was made; subject was compressed to 60 fsw. Noted complete resolution of all muscular pain and neck stiffness 10 min into first O <sub>2</sub> period; left hand stiffness was relieved 20 min into 1st O <sub>2</sub> period. TT6 was completed; Exam following day was normal.
19	Marginal	120	1120	"The second marginal DCS case occurred 18 hours and 40 minutes after surfacing from a dive to 12.2 msw (40 fsw). This case also involved a male diver (age = 30 years) who had transient and intermittent pain in his left knee. About 45 minutes after surfacing all symptoms were gone and no treatment was necessary"



Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	NSM6HR	0.0	3	28.0	360.0	3.0			nsm890214
2	NSM6HR	0.0	3	28.0	360.0	3.0			nsm890307
3	NSM6HR	0.0	4	28.0	360.0	3.0			nsm890323
4	NSM6HR	0.0	6	32.0	360.0	1.3			nsm890410,0523
5	NSM6HR	0.0	5	32.0	360.0	1.3			nsm890511,0516
6	NSM6HR	0.0	4	36.0	360.0	1.4			nsm890920
7	NSM6HR	0.0	3	36.0	360.0	1.4			nsm891004
8	NSM6HR	0.0	4	36.0	360.0	1.9			nsm891019
9	NSM6HR	0.0	3	38.0	360.0	0.7			nsm911015
10	NSM6HR	0.5	1	38.0	360.0	0.7	480.7	960.7	nsm911015
11	NSM6HR	0.0	3	38.0	360.0	1.1			nsm911017
12	NSM6HR	0.0	2	38.0	359.0	0.8			nsm911203
13	NSM6HR	1.0	1	38.0	359.0	0.8	480.8	4260.8	nsm911203
14	NSM6HR	0.0	4	40.0	360.0	1.5			nsm910205
15	NSM6HR	0.0	2	40.0	360.0	0.9			nsm910221
16	NSM6HR	1.0	1	40.0	360.0	0.9	370.9	425.9	nsm910221
17	NSM6HR	0.0	6	40.0	360.0	0.7			nsm910314,0821
18	NSM6HR	1.0	1	40.0	360.0	0.7	360.0	580.0	nsm910821
19	NSM6HR	0.5	1	40.0	360.0	0.7	480.7	1480.7	nsm910821

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## **SECTION VII: SUB-SATURATION**

### **C. RNPLX50**

- 57 dives: 5 DCS, 0 Marginal
  - All dives were dry.
  - Dives were conducted in the Spring of 1950.
  - Exercise: None
  - Descriptions of the DCS manifestations were taken from reference 1. The descriptions are brief, using the DCS classification established by the investigators; no times of onset were indicated therefore, no  $T_1$  and  $T_2$  times are indicated.
1. Crocker, WE, WM Davidson, FC Goodenough. Investigation into the Decompression Tables Report II: Progress report of the first series of human exposures. Report prepared for the Decompression Panel of the Underwater Physiology Sub-Committee of the R.N.P.R.C. Royal Navy Publication #50/628, July 1950.

## SECTION VII: SUB-SATURATION

C. RNPLX50

57 Dives: 5 DCS, 0 Marginal

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
3	0	0	Bend - definite pain near joint in limbs requiring recompression; this subject had a rash also
8	0	0	Severe Bend - very severe pain which usually recurred after therapeutic treatment; this case was treated with 3 recompressions
12	0	0	Bend - definite pain near joint in limbs requiring recompression
16	0	0	Severe Bend - very severe pain which usually recurred after therapeutic treatment.
16	0	0	Bend - definite pain near joint in limbs requiring recompression; this subject was treated with 2 recompressions

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	RNPLX50	0.0	2	31.00	720.00	1.03			None
2	RNPLX50	0.0	11	33.00	720.00	1.10			
3	RNPLX50	1.0	1	33.00	720.00	1.10			
4	RNPLX50	0.0	1	33.00	480.00	1.10			
5	RNPLX50	0.0	2	33.00	360.00	1.10			
6	RNPLX50	0.0	1	33.00	240.00	1.10			
7	RNPLX50	0.0	10	35.00	720.00	1.17			
8	RNPLX50	1.0	1	35.00	720.00	1.17			
9	RNPLX50	0.0	3	35.00	480.00	1.17			
10	RNPLX50	0.0	2	35.00	360.00	1.17			
11	RNPLX50	0.0	7	37.00	720.00	1.23			
12	RNPLX50	1.0	1	37.00	720.00	1.23			
13	RNPLX50	0.0	1	37.00	360.00	1.23			
14	RNPLX50	0.0	7	39.00	720.00	1.30			
15	RNPLX50	0.0	5	41.00	720.00	1.37			
16	RNPLX50	1.0	2	41.00	720.00	1.37			

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**IX. Surface  
Decompression ( $O_2$ )**

## **SECTION VIII: SURFACE DECOMPRESSION (AIR)**

### **A. EDU545SUR**

- 197 dives; 27 DCS, 12 Marginal
- Dives were mixed, wet or dry. Conditions are indicated in column 3 of the manifestation table that follows.
- Dives were conducted during the period October 1944 - March 1945
- Exercise: During the "rest" dives, the divers moved as little as possible while on bottom. The "work" dives entailed lifting a 70 lb weight (58 lb submerged) from a 26" bench 10 times per minute while on bottom (ref. 1).
- Diagnoses of DCS were initially made by Dr. Van der Aue as seen in ref (1). With the additional information from the dive logs, re-diagnoses were made in 07 April 1997 using the criteria established by Weathersby in 1988 (appendix A). The re-diagnoses were made by collective decision of the following:
  - CDR Charles Auken MC USN
  - LCDR Robert Ball MC USNR
  - LCDR Charles Toner MC USN
  - LCDR Daniel Valaik MC USN
  - LT Thomas Buttolph MC USN
  - Edward T. Flynn MD (MC USN RET)
- Detailed manifestation descriptions shown here were taken directly from the dive logs.

1. Van Der Aue, OE, ES Brinton, RJ Kellar. Surface Decompression, Derivation and Testing of Decompression Tables with Safety Limits for Certain Depth and Exposures. Naval Experimental Diving Unit, Technical Report 5-45, January 1945.

# SECTION VIII: SURFACE DECOMPRESSION (AIR)

A. EDU545SUR

197 dives; 27 DCS, 12 Marginal

Profile #	Outcome	Conditions	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
1	DCS	dry/work	30	138	<p>Uneventful dive until about 1400 when right shoulder bothered me - gone at 1545. About 1530 left knee started bothering me - it's stiff (probably from bicycle). Patient complained of slight deep pain in right wrist and area of right humerus. Noticed about 1600. Symptoms disappeared about 1900. Slept well. not unduly fatigued A.M. of 10/18/44. Feels well. No recompression or other Rx was given. Mild Bends. No Rx.</p> <p><i>Additional note:</i> 10/18/44 No symptoms. Took 7 min to come from 1st stop and again reach 1st stop. This due to fast venting of chamber took 3 min from 1st stop to surface. Could not vent faster. On future runs time allowed will be calculated for a maximum interval of 5 min from 1st stop to 1st stop.</p>
2	DCS	dry/work	10	25	<p>Developed pain in left elbow first noticed 12:15. Became steadily worse until 13:10 when he was recompressed. Obtained complete relief at 50 feet. Taken to 100 feet for 30 min. Following Rx:</p> <p>100 ft 30 min  80 ft 12 min  60 ft O<sub>2</sub> 28 min convulsions  40 ft air 35 min  30 ft " 42 min  20 ft " 52 min  10 ft " 68 min out chamber 1754</p> <p>Developed convulsions and unconsciousness from O<sub>2</sub> poisoning. No recurrence of bends.</p>
3	DCS	dry/work	30	150	<p>Developed pain in left shoulder about 1410 associated with tingling and a feeling of coldness of left hand and forearm. Pain was of moderate severity. After 1 hr consulted MO and was put in recompression chamber 1534. Partial relief at 40 feet and complete relief at 100 ft. Taken to 140 decompressed as follows:</p> <p>140 30 min 60 O<sub>2</sub> 30 min  120 12 min 50 O<sub>2</sub> 30 min  100 12 min 40 O<sub>2</sub> 30 min  80 12 min 40 O<sub>2</sub> to surface 5 min</p> <p>One half hour following surfacing patient noticed recurrence of pain left shoulder with slight paresthesia. This disappeared in 10-15 min and no further symptoms were noted. Following A.M. no complaints. There was no undue fatigue and no skin rash. Slept well</p>



4	M	dry/rest	-1	0	This patient noticed slight pain in left shoulder immediately after coming out of the chamber. This lasted about 1/2 hour and disappeared without any further trouble. Noticed very slight ache in right wrist about 1 hr after coming out which lasted only about 20 min. Thought he felt a transient pain in left wrist. After wrist pains left he had no further trouble. No fatigue was noticed and he slept well in the evening. Does not feel fatigued following A.M. No skin rash. This case is probably one of very mild bends not requiring recompression.
5	DCS	dry/rest	10	39	Very mild Bends. No Rx. This patient seemed a bit apprehensive about the experiment. Said he felt a slight pain in left shoulder about noon. Then said he noticed a transient pain in right shoulder which disappeared. At 1400 thought he noticed a spot in his vision off the point of vision. Described it as a arc-shape spot to the left of what he looked at. Said it looked like a spot usually noticed after looking at a bright light for a while. Retrosopic exam negative. He took a nap at 1630 with the slight "pain" in his left shoulder still present and the "eye spots" hardly perceptible. Awoke at 1900 with no symptoms. Was not unduly fatigued. Slept well that evening. No symptoms following A.M. This case is considered to be a case of mild bends. Some anxiety may be the cause of some of his symptoms.
6	DCS	dry/work	-1	15	15 min after run states he noticed a "pin wheel" (blind spot) in his right vision. Spot appeared to right of field of vision for that eye. Left eye OK. At 1215 noticed slight pain around both knee caps and @ 1245 slight pain in right shoulder. Noticed slight itching @ 1300 and fleeting pains in wrists and other joints @ 1440. Placed in recompression chamber @ 1442. At time of leaving surface patient had following complaints: "blind spot" still noticed in right eye disappeared @ 1400 but pain in right shoulder, slight wrist pains and slight pain both knees still present. Marbilization of skin noted in lower thoracic area posteriorly and bilaterally just before recompression. Patient obtained relief of all symptoms between 60-70 feet. Taken to 100 ft. Oxygen not prescribed due to low tolerance in the case. Taken down on air treatment table. 100 ft 30 min 40 ft 35 min 80 ft 12 min 30 ft 42 min 60 ft 26 min 20 ft 52 min 50 ft 30 min 10 ft 68 min Surfaced at 1946. Slept well. no further symptoms.
7	DCS	dry/rest	120	293	Felt fine until about 1630 when he noticed very slight pain in left knee. This was mild and was not reported to MO until 1900. Had no other symptoms. No recompression was decided immediately indicated. Slept well. No fatigue. Feels well following A.M. except for slight stiffness left knee.
8	DCS	dry/work	-58	-51	Right knee. Patient first noticed pain during first decompression at 20 ft - mild character - slightly worse at 10 ft then subsided to mild pain. At time of surfacing pain was still present, however, mild in character. Pain remained constant and 50 minutes later was quite severe. No rash or other symptoms than pain in right knee. Recompressed with complete relief at 20 ft. Taken on down to 100 ft and recompressed as follows: 100 ft 30 min 80 ft 12 min 60 ft breathing O <sub>2</sub> 24 min After 24 minutes breathing oxygen patient became nauseated. Pressure was reduced to 45 ft, breathed

8 (cont)					oxygen at 45 ft for 13 minutes and again became nauseated. Oxygen was removed and decompression on the air Rx table as follows: 45 ft 35 min 20 ft 52 min 30 ft 43 min 10 ft 68 min No complaints following surfacing.
9	DCS	dry/work	120	366	Pain left foot mild. Onset 1735. Appeared as general pain in foot with focus located below the astragalus not in the ankle joint. Gradually increased until recompression at 2001. Relief at 10 ft - compressed to 50 ft on oxygen for 30 min up to 40 ft on oxygen at 40 ft for 1 hour then 5 min to surface. Some residual soreness on surfacing. 24 hours later no symptoms. LS 2001 RB 2002 2005 (on oxygen) L 50' 2035 (on oxygen) R 40' 2036 (on oxygen) L 40' 2136 (on oxygen) RS 2142
10	DCS	dry/rest	120	389	Both ankles moderate pain. Onset @ 1800 both ankles in the joint. Point of tenderness anterior surface of ankle joint. Pain increased until quite severe. Recompressed at 1900 relief at 50 ft carried to 100 ft held for 30 min, 12 min at 80 ft. 60 ft on oxygen for 30 min. 50 ft on oxygen for 30 min. 40 ft on oxygen for 30 min. 5 min to surface. out at 2127. Some residual soreness on surfacing. 24 hours later no complaints. Note: this patient played quite hard at Ping Pong about 45 min in noon hour and about 1 hr around 1500. This might have some significant value as patient made a work run on 10-26-44 with no symptoms
11	Marginal	dry/work	10	30	Made work dive. About 30 min following dive, subject said he had blurred vision for a very short time which subsided - at one hour following dive he noticed a rash over his arms and trunk. When seen by MO this rash was a mild erythema, bilaterally distributed over the upper extremities and trunk. No joint pain was present. Nothing was done at this time. After two hours urine sample had been taken patient was given pure oxygen on the surface for 30 min - after 15 min the rash had practically disappeared. Patient had no following complaints.
12	DCS	dry/rest	-1	18	Noticed slight pain in left knee at about 11:45 which was transient in character and particularly noticeable on weight bearing. No other symptoms. This lasted for the remainder of the day. Case was not considered serious enough to warrant recompression. Patient slept well last evening. Awoke following A.M. still had transient pain in left knee. Also noticed slight pains in right knee. No other complaints. Case considered mild bends not warranting recompression. Pain is typically located under the patella and under both sides of patellar ligament.
13	DCS	wet/work water 57°	-52	-22	Patient developed sudden pain in left elbow @ 1123 when he reached and remained at 10 ft level for 23 min coming from his recompression decompression period. He was immediately taken down without surface and was taken to 100 feet. Prompt relief came about at 25 foot level and had no trouble since. Remained @ 100 ft treatment level for 30 min was brought out in the air treatment table as follows: L 10' 1145 R 100' 1147 (for 30 min) L 100' 1217

13 (cont)						<p>R 80' 1218 (for 12 min)</p> <p>L 80' 1230</p> <p>R 60' 1231 (for 26 min)</p> <p>L 60' 1257</p> <p>R 50' 1258 (for 30 min)</p> <p>L 50' 1328</p> <p>Recovery uneventful. No complaints or undue fatigue the following A.M.</p>
14	Marginal	wet/rest water 57°	30	135		<p>No Rx. No joint pains. Developed slight mottling of skin left waist level noticed @ 1400. No itching. This disappeared at 1600. This patient wore tight underdrawers during the experiment and the skin bends may have been due to impaired cutaneous circulation in that area. No other complaints. No Rx prescribed.</p>
15	Marginal	wet/work water 56°	-52	-22		<p>No complaints referable to bends. During decompression at 10 foot stop noticed slight fatigue ache in left biceps area. Was more noticeable on surfacing but disappeared in 30 min.</p>
16	DCS	wet/work water 57°	10	47		<p>Patient noticed very slight pain in right ankle about 1200 which lasted about 1/2 hour and disappeared. Patient had no other complaints until about 1700 when he noticed a return of pain in the same area (right ankle joint). This became steadily worse and at 2045 he was recompressed and given the following Rx. Oxygen was not used due to susceptibility of this patient to oxygen poisoning.</p> <p>left surface 2045</p> <p>reached 165 ft 2049 (remained 30 min)</p> <p>140 ft 12 min 50 ft 30 min</p> <p>120 ft 12 min 40 ft 35 min</p> <p>100 ft 12 min 30 ft 42 min</p> <p>80 ft 12 min 20 ft 52 min</p> <p>60 ft 25 min 10 ft 68 min</p> <p>Reached surface @ 0231</p> <p>Pressure produced definite relief of pain but did not completely give relief at 165 feet when patient still noticed slight but definite pain still present. Within 10-15 min @ 165' pain completely disappeared and the remainder of the decompression period was uneventful. Following A.M. patient had no residual complaints. No undue fatigue. No skin symptoms were present. Slept well.</p>
17	DCS	wet/work water 60°	10	29		<p>Probably nerve hit. Recurrence of joint bends.</p> <p>Patient came out of chamber at 1116 feeling perfectly well. Rested and slept awhile but at 1145 he noticed numbness of his right leg. Felt like his foot was asleep over the back part of thigh and upper. No pain. This persisted and became worse. Definite anesthesia was found on examination. Was put in chamber at 1205. Pressure relieved numbness but was still present at 100 feet. With increasing pressure he obtained complete relief at 150 feet. Taken to 165 feet where he was symptomless and took following Rx:</p> <p>L.S. @ 1205 Reached 165 @ 1211</p> <p>Remained at 165' 30 min</p> <p>140' 12 min 60' 30 min on O<sub>2</sub></p> <p>120' 12 min 50' 30 min on O<sub>2</sub></p>

17 (cont)					<p>100' 12 min 40' 30 min on O<sub>2</sub> 80' 12 min surfaced in 5 min on O<sub>2</sub> Reached surface 1511</p> <p>Patient felt well after recompression. At 1630 he noticed slight pain in left knee. Went out to eat and the pain became severe and extended upward toward perineum along inner aspect of left thigh about 1730. Was put in chamber @ 1808 and obtained complete relief at 20 feet. Was taken to 30 feet. Given 12 hour soak. Taken out on 2 hours @ 20 feet and 2 hours @ 10 feet. Surfaced in 5 min at 1016 on 11/16. No further symptoms.</p>
18	DCS	wet/rest water 58°	10	60	<p>Patient surfaced @ 1210. At 1310 he became nauseated, became dizzy and felt like fainting. B.P. 124/94 pulse 84. He lay down and was closely observed during next hour. His dizziness and apprehension became worse. He became pale and his hands were cold and clammy. Cyanosis became almost ashen grey. Placed in chamber @ 1440 and taken to 165 feet. At 100 feet he vomited brown undigested food and said he felt better. His color improved while being recompressed. After reaching 165 feet his color was definitely improved and after 60 min at this depth he was feeling much better but still complained of occasional dizziness on sitting up any length of time. After remaining at 165 for 1 hour he was decompressed on the saturation table to 30 feet where he was given a 24 hour soak, then 3 hrs @ 20 and 3 hrs @ 10 as follows: Left surface @ 1440 Reached 165 feet 1446 left 1 hour 140 ft 12 min 50 ft 30 min 120 ft 12 min 40 ft 36 min 100 ft 12 min reached 30 ft @ 1816 Nov 15 80 ft 12 min left 30 ft @ 1815 Nov 16 60 ft 12 min 20 ft 3 hours 10 ft. 3 hours Reached surface @ 0025 Nov 17. On Nov 17 patient felt slightly weak, otherwise he is OK. Physical and neurological examinations negative.</p>
19	Marginal	wet/work water 58°	-1	15	<p>Patient noticed itching in region of left ankle about 15 min after surface lasting about 15 min and disappearing without further recurrence. About 1730 noticed mild pain right knee region of fibular head. He lay down about 1 hr. Pain disappeared in about 45 min without further recurrence. No further complaints. Slept well. No fatigue. OK following day. No air Rx given or needed.</p>
20	DCS	wet/work water 58°	-52	-22	<p>Reached 10 feet on surface decompression and noticed slight pain in right wrist. On surfacing pain still present right wrist which lasted about 10 min and disappeared without further recurrence. About 2 hours after surface noticed an itchy rash and noticed some pain in right elbow. Patient had mild pain in right elbow, in biceps area and sometimes in right shoulder for remainder of day. Persisted at nite and planned to return to EDU for recompression several times during nite but the pains came and went away spontaneously at intervals. Slept OK. Following A.M. still had pain in right biceps, elbow, shoulder area. Put under recompression @ 0825. Relief was obtained at 20 ft. Given following Rx: Left surface 0825</p>

20 (cont)					<p>Reached 100 ft 0826 30 min air</p> <p>80 ft 11 min air</p> <p>60 ft 31 min O<sub>2</sub></p> <p>50 ft 30 min O<sub>2</sub></p> <p>40 ft 30 min O<sub>2</sub></p> <p>Reached surface 5 min O<sub>2</sub> @ 1047</p> <p>Slight residual soreness in volar forearm muscles, mild and transient. Left him completely by Sat nite (day of recompression). No further complaints.</p>
21	DCS	wet/work water 56°	30	120.	<p>Skin rash developed about 1330 and lasted to about 1500 at site of lower costal margin right side. Not much itching but rather tender. At 1400 patient began to notice slight pains in right knee joint which were intermittent in character. Also noticed a few "twinges" in right ankle joint. These subsided temporarily in the latter afternoon. However, by early evening, the pains returned in the knee and became gradually worse about 2000. He returned to the Diving unit and recompressed at 2255. Definite relief was obtained at 60 feet. Taken to 100 ft and brought out on air treatment table because of previous idiosyncrasy and low tolerance to oxygen. Rx as follows. Left surface @ 2255</p> <p>Reached 100' @ 2258 stayed 30 min</p> <p>80' 12 min 30' 42 min</p> <p>60' 26 min 20' 52 min</p> <p>50' 30 min 10' 68 min</p> <p>40' 35 min reached surface 0406 on 11/21/44</p> <p>On A.M. of 11/21 patient had no complaints except moderate fatigue.</p>
22	DCS	wet/rest water 54°	-52	-22	<p>On reaching 10 ft stop on surface decompression, subject noticed slight pain in left elbow which disappeared shortly afterward. On reaching surface developed pain in both shoulders but pain in left shoulder was intermittent. 2.5 hrs after surfacing, subject was recompression. At 20 feet he obtained complete relief. Taken to 100 feet and treated on air Rx table as follows:</p> <p>100 ft 30 min 40 ft 35 min</p> <p>80 ft 12 min 30 ft 42 min</p> <p>60 ft 26 min 20 ft 52 min</p> <p>50 ft 30 min 10 ft 68 min</p> <p>Surface 3 min. On surfacing subject had no complaints and felt normal.</p>
23	DCS	wet/rest water 42°	10	30	<p>Upon surfacing this subject complained of moderate skin itch of both forearms without rash. Itch seemed to be confined to arms below level of elbows. This remained about 30-40 min and finally disappeared. About 1/2 hour after dive subject noticed some soreness of his left shoulder over humeral head. Within the following 1/2 hour this soreness became worse and traveled downward over the deltoid region and over the triceps muscles as far down as the elbow. He was recompressed at 1231 (1 hr 35 min after surfacing) and obtained relief at 32 ft. Taken to 100 ft and decompressed as follows:</p> <p>100 ft (reached 1235) 30 min</p> <p>80 ft 12 min 40 ft 30 min on O<sub>2</sub></p> <p>60 ft 30 min on O<sub>2</sub> surfaced 5 min on O<sub>2</sub></p> <p>50 ft 30 min on O<sub>2</sub> reached surface @ 1451 No further complaints.</p>

51	DCS	wet/work water 44°	-1	0	<p>This subject stated he first noticed a headache of moderate intensity on surfacing. States it seemed to be behind the eyes. No visual disturbances. Had no difficulty during dive clearing air passages of ears or sinuses. This moderate headache lasted about 24 hours. About 1500 he developed a moderate skin rash over right deltoid and upper arm (anteriorly and laterally) which caused no itching. Was first on oxygen on surface for 30 min and rash disappeared. Went home feeling quite well except for slight headache. About 1800 he noticed mild fleeting pains in various joints on right side involving wrist, elbow, knee and ankle on right side. These pains were mild and transient in character and subject did not report for aid as he thought his symptoms were mild and would subside. Slept well. Following AM had only slight headache. Right triceps area was still sore. Seen 14/18 and he had an ecchymotic area about 3" in diameter with two petechial heads over right triceps area. Some induration present indicative of rather deep extravasation of blood. This patient definitely had some peripheral vascular damage. Trauma as a cause for this bruise could not be accounted for. Intravascular bubbles may be the etiological factor. This case should have been given Rx by recompression. Note: this subject gave 1/2 pint of blood to blood donor service on the afternoon of the day preceding dive. This was not known until after his dive was made. This may have some etiological bearing in this case. Said he felt well after giving blood except for slight nausea following donation. Note RBC is slightly down.</p>
52	Marginal	wet/work water 42°	-1	0	<p>No complaints except moderate fatigue. Ate evening meal and vomited about 1/2 hr afterward. Vomited 3 more times that evening. Following day he just felt weak. Stayed home. Ate lightly. Attack of gastritis may be entirely independent of run. Possibly might be due to exposure in cold water 42° although subject states he didn't feel quite as cold as he did on other previous dives. No joint pains or skin manifestation are present. Slight diarrhea present on 12-20-44. A case of mild enteritis.</p>
53	Marginal	wet/work water 42°	-73	-72	<p>During recompression on surfacing this subject said he noticed slight pains in left wrist. These lasted about 1 hour and disappeared. No skin complaints. No fatigue. This subject usually gets some symptoms in his left upper extremity. See previous reports.</p>
54	Marginal	wet/work water 46°	-1	0	<p>No complaints on this run which was identical with above run [indicated as "cancelled" in log] except that air pressure above the 7 ft of water in tank was left @ 17' instead of 13'. 17' gives approximately 20' helmet pressure whereas 13' will give only about 16' helmet pressure for the 20' stop. Noticed slight generalize itching on reaching 1st stop which disappeared in a few minutes. On reaching surface this itch returned and remained until surface recompression was given. Had no itch in chamber stops. On surfacing, the itch returned and lasted about 2 hours. Noticed a slight maculopapular eruption which lasted about 4 hours and disappeared. No other complaints except moderate fatigue after dive.</p>
55	DCS	wet/rest water 52°	10	60	<p>Felt well until time when he made his final surfacing when he complained of generalized skin itch (without rash) which lasted for about 1/2 hour. Felt well after his itch but about 1 hour after surfacing noticed some pain in his right wrist over volar aspect This traveled into the base of his hand (ball of hand) and in the palm and remained there. It was described as a deep pain but not severe. This remained throughout the day and night. About 2300 on nite of dive, patient said he was awakened from his sleep with pain in his right big toe. Also noted paresthesia in his left foot and leg from about the level of the knee downward. The pain in his right big toe disappeared after 1/2 hour and the paresthesia disappeared after 1 hour in his left foot. Had no other symptoms except the slight dull pain in his right hand. Fell asleep and awoke the following AM with slight residual soreness in his right palm.</p>

55 (cont)					Following day after dive this subject served as a tender for another bends case and entered chamber @ 60 ft. Obtained slight relief. Came out on 90 min O <sub>2</sub> but on reaching surface return of his slight discomfort came back. On 2nd day after dive, this patient had only slight residual soreness in his hand.
56	DCS	wet/work water 54°	-1	0	<p>Patient felt well during wet tank dive. On reaching surface he noticed a sudden mild pain in right elbow region (origin of brachio radialis). On recompression in dry chamber this subsided to a dull ache at the 20 foot stop and lasted throughout the dry run. On finally reaching surface pain became more intense and within 5 min became excruciating (extreme tenderness of brachio-radialis origin) and he was put under pressure for Rx in 5 min. Just before Rx dive he noticed some pain in left shoulder blade area near insertion of trapezius. Rx dive gave him partial relief @ 70 feet and complete relief at 90 feet. Taken to 165 feet and brought out on 165 O<sub>2</sub> table as follows:</p> <p>Left surface 1100. Reached 165 @ 1107. 30 min</p> <p>140 ft 12 min 80 ft 12 min</p> <p>120 ft 12 min 60 ft 30 min on O<sub>2</sub></p> <p>100 ft 12 min 50 ft 30 min on O<sub>2</sub> 40 ft 30 min on O<sub>2</sub></p> <p>At 40 ft level began to get symptoms of extreme irritability, anger and disorientation. Wanted to get that mask off, get out of chamber and thought his tenders were "framing him". Put on air and came out uneventfully as follows:</p> <p>40 ft continued 8 min</p> <p>30 ft 2 hrs</p> <p>20 ft 2 hrs</p> <p>10 ft 4 hrs</p> <p>Surfaced at 2206. Slight residual soreness in left elbow in cubital space remaining until next AM.</p>
57	DCS	wet/work water 48°	-1	15	<p>Had no complaints until about 1100 (15 min after surfacing) when he noticed very mild pain in the biceps area of right arm. Seemed to travel downward, involving the brachioradialis and volar aspect of forearm. Pain was never severe, did not get any worse &amp; subject withstood the discomfort. Remained until about 2300. Seemed to return to the medial aspect of the right biceps and finally disappeared. Subject had a restless nite and was quite fatigued. Following AM no complaints except fatigue.</p>
58	DCS	wet/work water 48°	-32	-31	<p>Patient's first complaint was noted in the dry chamber, coming from the 20 to 10 ft stop. Noticed slight pain in right shoulder. This disappeared before surfacing but came on gradually again about 1/2 hour after surfacing. This continued and gradually became worse. Pain became severe and throbbing in character ~ 1345. Was put in chamber for Rx at 1405 3.5 hrs after dive. No relief until reaching 165 ft. The throbbing disappeared by within 5 min the pain was definitely relieved. On decompression, pain completely disappeared when 120 ft was reached. Rx as follows:</p> <p>Left surface 1405 Reached 165 @ 1417 30 min</p> <p>140 ft 12 min 60 ft 30 min on O<sub>2</sub></p> <p>120 ft 12 min 50 ft 30 min on O<sub>2</sub></p> <p>100 ft 12 min 40 ft 30 min on O<sub>2</sub></p> <p>80 ft 12 min 30 ft 60 min on O<sub>2</sub></p> <p>Surface 5 min on O<sub>2</sub> No further complaints except he had slight skin itch over bridge of nose, over right arm and forearm between his water dive and recompression dive.</p>

59	DCS	wet/work no temp indicated	120	449	Had no complaints immediately after dive. At 1830 while in the movies he noticed some pain in his right wrist (volar aspect). This lasted about 15 min. It then disappeared and soon after his left wrist became painful at the corresponding site associated with some numbness of forearm. This traveled up toward cubital fossa, became throbbing in character and then disappeared after 15 min to be followed by a flushed feeling over the nape of the neck with tingling sensation. This disappeared and a sharp deep frontal headache came on over right eye. Called M.O. and was told to try O <sub>2</sub> inhalation. Did so for 1/2 hour which completely relieved him of all symptoms except moderate fatigue which remained. While he had his headache, his friends noticed that patient's eyes were bloodshot and reddened. Following O <sub>2</sub> , there were no further complaints.
60	Marginal	wet/work water 48°	-1	0	No complaints. Had mild itch on reaching 1st stop in water which disappeared during this stop without further recurrence. After final surfacing however, patient had a mild generalized rash of macular and papular variety which gradually faded away in 5-6 hours.
61	Marginal	wet/rest water 56°	120	720	No complaints. Patient states he noticed mild soreness and a "tired feeling" in his right arm around insertion of deltoid which came on about 2230 on the evening of his dive lasting 10 min and disappearing without further recurrence. Bends origin doubtful. This subject had no skin itch after his dive. No post dive fatigue. No other complaints.
62	DCS	wet/rest water 54°	-53	-29	Subject had no complaints during his wet dive. There was no itch at any time. Entered chamber for recompression symptomless. Shortly before leaving 20 ft stop in dry chamber he noticed some pain in his left shoulder. On reaching 10 ft stop this pain was slightly less and remained mild until just before leaving 10 foot stop it began to get worse again. On surfacing @ 1049 the pain was moderately severe. It seemed generalized throughout the shoulder, no particular area being tender. The pain was deep around the joint. Pain continued until Rx was given @ 1109. He got prompt relief at 5 ft level. Taken to 100 ft and decompressed as follows: Left surface 1109 reached 100 ft @ 1112 30 min 80 ft 12 min on O <sub>2</sub> 60 ft 30 min on O <sub>2</sub> 50 ft 30 min on O <sub>2</sub> 40 ft 30 min on O <sub>2</sub> surfaced 5 min on O <sub>2</sub> Reached surface 1333 Felt well after surfacing. This was a mild case of bends but Rx was given. No complaints after Rx except that about 2130 he noticed some skin itch over the top of his left shoulder. He went to bed and fell asleep and woke up symptomless the following AM. Patient was fatigued after his dive and during the rest of that day but felt well the following day. Note: 3 min additional decompression time was given by tender in error in that diver was recompressed at 10 ft for 3 min before error was discovered at which time he was taken to 20 ft and routine decompression followed thereafter.
63	DCS	wet/rest water 56°	-88	-53	Subject had no complaints during tank dive and on subsequent surface. In the dry chamber he noticed a mild pain in his right shoulder. It was an ill defined pain but was more or less localized over external area of humeral head. Subject states that this was the shoulder he pulled or strained 5 years ago disabling him for 3 weeks at that time. The pain remained after surfacing, mild in character and disappeared in 2 hours. No skin itch or rash. No fatigue.



64	Marginal	wet/work water 56°	30	147	No complaints. Subject states he noticed a sharp "needle like" pain in right knee over medial lemniscus at about 1300 which was transitory and lasted about 5 min. No further trouble. Whether this was bends or not is doubtful. No skin itch was experienced. No post-dive fatigue.
65	Marginal	wet/work water 62°	-88	-53	No complaints. Subject noticed itching of skin over both arms after reaching 20 foot tank stop. Itching remained throughout this stop, on surfacing and throughout chamber recompression stops. At the 20 ft stop in chamber a slight macular skin rash appeared over arms and back area pained (sic) by the itching. This subsided on surfacing but rash and itch did not completely disappear until about 1 hour after final surfacing. No joint pains or fatigue.
66	DCS	wet/work water 62°	120	286	Subject noticed slight itch at water stop (20 ft) and again at 20 ft chamber stop about arms and face. Disappeared at 20 ft chamber stop. About 1615 (6 hrs after dive) noticed a p???date rash over arms, chest and abdomen without any symptoms of itch which lasted to about 1830 at which time it completely faded. About 1500 also noticed a mild soreness in the right deltoid area which seemed to wander downward over the biceps area into forearm muscles & tendons during the following 1.5 hrs and disappeared. Soon afterward he noticed a slight soreness over dorsum of left forearm which disappeared in a few mins. Went home feeling well except for the rash which he noticed. Mowed some grass about 1800 and noticed a return of his soreness in the right deltoid area which was more severely (sic) than previously noted and caused him to stop his work. He decided to return to EDU but while changing clothes, his symptoms disappeared in a half hour. Did not report and no further symptoms developed. No further complaints except for residual soreness of right deltoid muscle which was noticed the following AM and remained for that day and the following day.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	EDU545SUR	1.0	1	100.0	85.0	75.0	190.0	298.0	EDU
2	EDU545SUR	1.0	1	100.0	85.0	73.0	168.0	183.0	EDU
3	EDU545SUR	1.0	1	100.0	85.0	72.0	187.0	307.0	EDU
4	EDU545SUR	0.5	1	100.0	85.0	72.0	156.0	157.0	EDU
5	EDU545SUR	1.0	1	100.0	85.0	72.0	167.0	196.0	EDU
6	EDU545SUR	1.0	1	100.0	85.0	72.0	156.0	172.0	EDU
7	EDU545SUR	1.0	1	100.0	85.0	72.0	277.0	450.0	EDU
8	EDU545SUR	1.0	1	100.0	85.0	72.0	99.0	106.0	EDU
9	EDU545SUR	1.0	1	100.0	85.0	72.0	277.0	523.0	EDU
10	EDU545SUR	1.0	1	100.0	85.0	72.0	277.0	546.0	EDU
11	EDU545SUR	0.5	1	100.0	85.0	72.0	167.0	187.0	EDU
12	EDU545SUR	1.0	1	100.0	85.0	72.0	156.0	175.0	EDU
13	EDU545SUR	1.0	1	100.0	85.0	71.0	104.0	134.0	EDU
14	EDU545SUR	0.5	1	100.0	85.0	71.0	186.0	291.0	EDU
15	EDU545SUR	0.5	1	100.0	85.0	71.0	104.0	134.0	EDU
16	EDU545SUR	1.0	1	100.0	85.0	74.0	169.0	206.0	EDU
17	EDU545SUR	1.0	1	100.0	85.0	71.0	166.0	185.0	EDU
18	EDU545SUR	1.0	1	100.0	85.0	72.0	167.0	217.0	EDU
19	EDU545SUR	0.5	1	100.0	85.0	72.0	156.0	172.0	EDU
20	EDU545SUR	1.0	1	100.0	85.0	73.0	106.0	136.0	EDU
21	EDU545SUR	1.0	1	100.0	85.0	74.0	189.0	279.0	EDU
22	EDU545SUR	1.0	1	100.0	85.0	72.0	105.0	135.0	EDU
23	EDU545SUR	1.0	1	130.0	55.0	95.0	160.0	180.0	EDU
24	EDU545SUR	0.0	1	100.0	85.0	75.0			EDU545 LOG 31
25	EDU545SUR	0.0	2	100.0	85.0	72.0			EDU545 LOG 31
26	EDU545SUR	0.0	1	100.0	85.0	73.0			EDU545 LOG 31
27	EDU545SUR	0.0	9	100.0	85.0	72.0			EDU545 LOG 31
28	EDU545SUR	0.0	10	100.0	85.0	72.0			EDU545 LOG 31



62	EDU545SUR	1.0	1	170.0	30.0	91.0	68.0	92.0	EDU
63	EDU545SUR	1.0	1	170.0	30.0	88.0	30.0	65.0	EDU
64	EDU545SUR	0.5	1	170.0	30.0	88.0	148.0	265.0	EDU
65	EDU545SUR	0.5	1	170.0	30.0	88.0	30.0	65.0	EDU
66	EDU545SUR	1.0	1	170.0	30.0	88.0	238.0	404.0	EDU
67	EDU545SUR	0.0	5	130.0	55.0	94.0			EDU545 LOG 32
68	EDU545SUR	0.0	1	130.0	55.0	95.0			EDU545 LOG 32
69	EDU545SUR	0.0	3	130.0	55.0	95.0			EDU545 LOG 32
70	EDU545SUR	0.0	6	130.0	55.0	94.0			EDU545 LOG 32
71	EDU545SUR	0.0	2	130.0	55.0	94.0			EDU545 LOG 32
72	EDU545SUR	0.0	2	130.0	55.0	96.0			EDU545 LOG 32
73	EDU545SUR	0.0	16	150.0	38.0	98.0			EDU545 LOG 32
74	EDU545SUR	0.0	3	150.0	38.0	99.0			EDU545 LOG 32
75	EDU545SUR	0.0	1	150.0	38.0	99.0			EDU545 LOG 32
76	EDU545SUR	0.0	10	150.0	38.0	98.0			EDU545 LOG 32
77	EDU545SUR	0.0	1	150.0	38.0	98.0			EDU545 LOG 32
78	EDU545SUR	0.0	3	170.0	30.0	88.0			EDU545 LOG 32
79	EDU545SUR	0.0	14	170.0	30.0	88.0			EDU545 LOG 32
80	EDU545SUR	0.0	2	170.0	30.0	89.0			EDU545 LOG 32
81	EDU545SUR	0.0	2	170.0	30.0	89.0			EDU545 LOG 32
82	EDU545SUR	0.0	3	170.0	30.0	88.0			EDU545 LOG 32
83	EDU545SUR	0.0	2	170.0	30.0	90.0			EDU545 LOG 32
84	EDU545SUR	0.0	1	170.0	30.0	91.0			EDU545 LOG 32

## SECTION VIII: SURFACE DECOMPRESSION (AIR)

### B. NMRASUR90

- 64 dives; 0 DCS, 0 Marginal
- Dives were wet, but water temperatures were not recorded in the log.
- Dives were conducted during the period November-December 1990
- Exercise: the log records an exercise regimen of 10 minutes work, 10 minutes rest while on bottom. However, no description of the work performed was located.
- There were no cases of DCS during this series, so no manifestations are described.

1. No report was published from this dive series.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	Data Set Notations
1	nmrasur90	0.0	3	60.0	179.0	82.9	surd101
2	nmrasur90	0.0	3	60.0	179.4	81.3	surd102
3	nmrasur90	0.0	3	60.0	179.0	84.9	surd103
4	nmrasur90	0.0	3	60.0	180.9	81.4	surd104
5	nmrasur90	0.0	3	60.0	178.8	81.5	surd105
6	nmrasur90	0.0	3	60.0	179.1	53.7	surd107
7	nmrasur90	0.0	3	60.0	179.0	81.7	surd108
8	nmrasur90	0.0	2	60.0	179.1	81.8	surd109
9	nmrasur90	0.0	3	60.0	179.1	81.9	surd110
10	nmrasur90	0.0	3	60.0	179.1	81.9	surd111
11	nmrasur90	0.0	3	60.0	179.1	81.8	surd112
12	nmrasur90	0.0	3	120.0	49.0	98.9	surd201
13	nmrasur90	0.0	3	120.0	49.0	98.7	surd202
14	nmrasur90	0.0	3	120.0	49.1	98.7	surd203
15	nmrasur90	0.0	3	120.0	49.1	98.5	surd204
16	nmrasur90	0.0	3	120.0	49.1	99.0	surd205
17	nmrasur90	0.0	3	120.0	49.1	98.9	surd206
18	nmrasur90	0.0	3	120.0	49.0	98.7	surd207
19	nmrasur90	0.0	2	120.0	49.1	98.2	surd208
20	nmrasur90	0.0	3	120.0	49.1	98.3	surd209
21	nmrasur90	0.0	3	120.0	49.1	98.6	surd210
22	nmrasur90	0.0	3	120.0	49.0	98.4	surd211

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## SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

### A. EDU1351SD

- 1035 dives; 20 DCS, 233 Marginal
- Dives were wet; average water temperature was 66.9° F.
- Dives were conducted during the period the period 1945-46
- Exercise: all divers performed moderately heavy work at depth; "lifting and lowering a lead bucket, weighing 62 pounds underwater, to and from a submerged table 26 inches high." (reference 1)
- Manifestations are presented directly from the codes described in Table 1 of reference 1, as follows:
  - A - No symptoms
  - B - Skin itch on surface
  - B' - Skin itch at water stops
  - C - Moderate fatigue
  - D - Severe fatigue
  - E - Skin rash. Also includes the following other symptoms during the surface interval:
    - (a) Mild or transient pains
    - (b) Chest pains on deep inspiration (mild chokes)
    - (c) Paresthesias
  - F - Transient or mild pains not requiring recompression therapy
  - G - Other symptoms not requiring recompression therapy. Includes:
    - (a) Chest pains on deep inspiration (mild chokes)
    - (b) Muscle or joint stiffness with no pain present
    - (c) Paresthesias
    - (d) Vertigo
  - H - Permanent or severe pains requiring recompression therapy
  - I - Symptoms involving central nervous system. Includes:
    - (a) Visual disturbances
    - (b) Vertigo
    - (c) Paresthesias
    - (d) Paresis
    - (e) Paralysis
    - (f) Severe headache
  - J - Symptoms involving pulmonary system. Includes:
    - (a) Chokes
    - (b) Cyanosis
  - K - Other
- DCS events were diagnosed using the 1988 Weathersby et. al. criteria for diagnosis at NMRI on 17 December 1997 by CDR Charles Auker  
LCDR Chuck Toner  
LCDR Dan Valaik  
LT Tom Buttolph

1. Van Der Aue, OE, RJ Kellar, ES Brinton, et. al. Calculation and Testing of Decompression Tables for Air Dives Employing the Procedure of Surface Decompression and the Use of Oxygen. Experimental Diving Unit U.S. Naval Gun Factory Report No. 13-51. November 1951

## SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

### A. EDU1351SD 1035 dives: 20 DCS, 233 Marginal

Profile #	Outcome	# divers w/ DCS outcome	T <sub>1</sub> (mins)	T <sub>2</sub> (mins)	Signs & Symptoms
2	0.5	3	-1.96	1440.04	3 divers, moderate fatigue
4	0.5	2	-1.80	1440.20	2 divers, moderate fatigue
7	0.5	3	-1.80	1440.20	3 divers, moderate fatigue
9	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
12	0.5	2	-1.80	1440.20	2 divers, moderate fatigue
13	0.5	1	-74.80	-52.30	1 diver with skin rash and chest pains on deep inspiration (mild chokes) during surface interval; transient or mild pains not requiring recompression therapy after surfacing
16	0.5	6	-1.96	1440.04	5 divers, moderate fatigue
18	0.5	3	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
22	0.5	1	-1.96	1440.04	3 divers, moderate fatigue
24	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
25	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
27	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
29	0.5	2	-1.96	1440.04	1 diver, moderate fatigue
30	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
32	0.5	2	-1.96	1440.04	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
33	0.5	1	-1.96	1440.04	2 divers, moderate fatigue
35	0.5	2	-1.96	1440.04	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
37	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
39	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
42	0.5	2	-1.96	1440.04	1 diver, moderate fatigue
44	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
					1 diver, moderate fatigue
					1 diver, transient or mild pains not requiring recompression therapy



46	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
48	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
50	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
52	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
54	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
57	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
58	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
61	0.5	3	-1.96	1440.04	3 divers, moderate fatigue
63	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
65	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
66	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
69	0.5	3	-1.96	1440.04	3 divers, moderate fatigue
70	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
71	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
73	0.5	2	-1.96	1440.04	2 divers, moderate fatigue
77	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
79	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
80	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
82	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
83	0.5	1	-1.96	1440.04	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
85	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
89	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
91	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
92	0.5	1	-1.96	1440.04	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
93	1.0	1	-1.96	1440.04	1 diver, moderate fatigue and symptoms involving central nervous system - visual disturbances
98	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
99	0.5	1	-1.96	1440.04	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
101	0.5	2	-1.96	1440.04	2 divers, transient or mild pains not requiring recompression therapy
102	1.0	1	-1.96	1440.04	1 diver, moderate fatigue and symptoms involving central nervous system - paresthesias and paresis.

105	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
110	0.5	3	-1.96	1440.04	3 divers, transient or mild pains not requiring recompression therapy
112	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
114	0.5	2	-1.96	1440.04	2 divers, severe fatigue
116	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
119	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
120	1.0	1	-1.96	1440.04	1 diver, permanent or severe pains requiring recompression therapy
124	0.5	5	-1.96	1440.04	5 divers, moderate fatigue
128	0.5	2	-1.80	1440.20	2 divers, moderate fatigue
129	0.5	4	-1.80	1440.20	4 divers, moderate fatigue
132	1.0	1	-1.80	1440.20	1 diver, permanent or severe pains requiring recompression therapy
135	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
138	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
141	0.5	1	-1.96	1440.04	1 diver, severe fatigue and transient or mild pains not requiring recompression therapy
143	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
145	0.5	4	-1.80	1440.20	4 divers, moderate fatigue
146	0.5	3	-1.80	1440.20	3 divers, moderate fatigue
147	0.5	1	-1.80	1440.20	1 diver, severe fatigue and transient or mild pains not requiring recompression therapy
149	0.5	2	-1.80	1440.20	2 divers, moderate fatigue
150	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
154	0.5	3	-2.40	1439.60	3 divers, moderate fatigue
156	1.0	1	-2.40	1439.60	1 diver, moderate fatigue and permanent or severe pains requiring recompression therapy
159	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
160	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
162	0.5	2	-2.40	1439.60	1 diver, moderate fatigue
163	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
168	0.5	1	-1.96	1440.04	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
170	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
172	0.5	1	-1.96	1440.04	1 diver, moderate fatigue

174	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
177	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
178	0.5	1	-1.80	1440.20	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
180	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
181	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
182	1.0	1	-1.80	1440.20	1 permanent or severe pains requiring recompression therapy
183	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
184	1.0	1	-1.80	1440.20	1 diver, symptoms involving central nervous system - vertigo and severe headache; symptoms involving pulmonary system - chokes
188	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
190	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
192	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
194	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
197	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
208	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
209	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
211	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
212	0.5	1	-2.40	1439.60	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
214	0.5	3	-3.00	1439.00	3 divers, moderate fatigue
216	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
218	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
220	1.0	1	-2.40	1439.60	1 diver, moderate fatigue and permanent or severe pains requiring recompression therapy
226	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
227	1.0	1	-1.96	1440.04	1 diver, skin rash and transient or mild pains not requiring recompression therapy
232	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
234	0.5	1	-40.00	-25.30	1 diver, skin rash during surface interval
237	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
243	0.5	1	-3.00	1439.00	1 diver, moderate fatigue
245	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
247	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy; other symptoms not requiring

					recompression therapy - muscle or joint stiffness with no pain present
249	0.5	2	-1.80	1440.20	2 divers, transient or mild pains not requiring recompression therapy
251	1.0	1	-1.80	1440.20	1 diver, moderate fatigue and permanent or severe pains requiring recompression therapy
253	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
262	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
266	0.5	1	-3.00	1439.00	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
271	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
272	1.0	1	-2.40	1439.60	1 diver, permanent or severe pains requiring recompression therapy
274	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
276	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
277	0.5	1	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
279	0.5	1	-1.96	1440.04	1 diver, moderate fatigue
286	0.5	1	-1.80	1440.20	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
287	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
288	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
291	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
292	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
293	0.5	1	-2.40	1439.60	1 diver, moderate fatigue; other symptoms not requiring recompression therapy - muscle or joint stiffness with no pain present
297	0.5	2	-1.80	1440.20	2 divers, moderate fatigue
300	0.5	2	-2.40	1439.60	1 diver, moderate fatigue
301	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
303	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
305	0.5	1	-2.40	1439.60	1 diver, transient or mild pains not requiring recompression therapy
306	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
308	0.5	1	-3.00	1439.00	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
310	0.5	1	-2.40	1439.60	1 diver, moderate fatigue
311	1.0	1	-2.40	1439.60	1 diver, symptoms not requiring recompression therapy - paresthesias
316	0.5	1	-1.80	1440.20	1 diver, permanent or severe pains requiring recompression therapy
					1 diver, transient or mild pains not requiring recompression therapy

317	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
319	0.5	2	-3.00	1439.00	2 divers, moderate fatigue
321	0.5	2	-3.00	1439.00	2 divers, moderate fatigue
324	0.5	1	-3.60	1438.40	1 diver, moderate fatigue
326	0.5	2	-3.00	1439.00	2 divers, moderate fatigue
328	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
329	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
330	1.0	1	-71.40	-52.30	1 diver, skin rash, mild or transient pains, and chest pains on deep inspiration (mild chokes) during surface interval; moderate fatigue and transient or mild pains not requiring recompression therapy after surfacing
335	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
337	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
338	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
342	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
345	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
346	0.5	1	-42.80	-25.30	1 diver, skin rash and paresthesias during surface interval
349	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
351	1.0	1	-1.80	1440.20	1 diver, permanent or severe pains requiring recompression therapy and symptoms involving central nervous system - paresis
357	0.5	1	-2.40	1439.60	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
358	1.0	1	-2.40	1439.60	1 diver, permanent or severe pains requiring recompression therapy
362	0.5	1	-3.00	1439.00	1 diver, moderate fatigue
366	0.5	4	-3.60	1438.40	3 divers, moderate fatigue
367	0.5	2	-3.00	1439.00	1 diver, transient or mild pains not requiring recompression therapy
370	1.0	1	-3.00	1439.00	2 divers, transient or mild pains not requiring recompression therapy
372	0.5	1	-3.00	1439.00	1 diver, permanent or severe pains requiring recompression therapy
376	1.0	1	-3.00	1439.00	1 diver, moderate fatigue
378	0.5	1	-3.60	1438.40	1 diver, moderate fatigue
381	0.5	1	-3.00	1439.00	1 diver, skin rash
383	0.5	1	-3.00	1439.00	1 diver, transient or mild pains not requiring recompression therapy
385	0.5	1	-3.60	1438.40	1 diver, moderate fatigue

387	0.5	1	-3.60	1438.40	1 diver, transient or mild pains not requiring recompression therapy
393	0.5	1	-18.0	1440.20	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
399	0.5	2	-1.96	1440.04	2 divers, transient or mild pains not requiring recompression therapy
405	0.5	1	-1.80	1440.20	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
406	1.0	1	-1.80	1440.20	1 diver, permanent or severe pains requiring recompression therapy and symptoms involving central nervous system - paresis
407	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
410	0.5	1	-1.80	1440.20	1 diver, transient or mild pains not requiring recompression therapy
411	0.5	1	-1.80	1440.20	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
412	1.0	1	-1.80	1440.20	1 diver, moderate fatigue, skin rash, and transient or mild pains not requiring recompression therapy
414	0.5	1	-2.40	1439.60	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
415	0.5	2	-2.40	1439.60	2 divers, transient or mild pains not requiring recompression therapy
416	0.5	2	-2.40	1439.60	2 divers, symptoms not requiring recompression therapy - paresthesias
417	0.5	1	-2.40	1439.60	1 diver, moderate fatigue and transient or mild pains not requiring recompression therapy
419	0.5	1	-2.40	1439.60	1 diver, transferred to chamber at 30 fsw, itched at 40 fsw; skin rash after surfacing
420	0.5	1	-2.40	1439.60	1 diver, transferred to chamber at 30 fsw, itched at 30 fsw; transient or mild pains not requiring recompression therapy after surfacing
421	0.5	1	-2.40	1439.60	1 diver, transferred to chamber at 30 fsw, itch and rash 40 fsw; transient or mild pains not requiring recompression therapy; other symptoms not requiring recompression therapy - vertigo, after surfacing
423	0.5	2	-1.96	1440.04	1 diver, transient or mild pains not requiring recompression therapy
					1 diver, symptoms not requiring recompression therapy - muscle of joint stiffness with no pain present and paresthesias
426	0.5	1	-79.60	-53.90	1 diver, skin rash and chest pains on deep inspiration (mild chokes) during surface interval
431	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
433	0.5	1	-1.80	1440.20	1 diver, moderate fatigue
434	0.5	1	-73.40	-49.30	1 diver, skin rash and mild or transient pains during surface interval; other symptoms not requiring recompression therapy - muscle or joint stiffness with no pain present after surfacing
435	1.0	1	0	0	1 diver, itch and sharp suboccipital /sic/ pains developed at 30 fsw stop; recompressed to 100' complete relief at 52'. Bends Rx 1.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	edu1351sd	0.0	1	104.0	85.0	4.2			EDU1351SD #1
2	edu1351sd	0.5	3	104.0	85.0	4.2	138.2	1580.2	EDU1351SD #1
3	edu1351sd	0.0	2	134.0	60.0	9.4			EDU1351SD #2
4	edu1351sd	0.5	2	134.0	60.0	9.4	126.4	1568.4	EDU1351SD #2
5	edu1351sd	0.0	4	154.0	38.0	11.2			EDU1351SD #3
6	edu1351sd	0.0	3	154.0	50.0	16.2			EDU1351SD #4
7	edu1351sd	0.5	3	154.0	50.0	16.2	121.2	1563.2	EDU1351SD #4
8	edu1351sd	0.0	1	154.0	50.0	16.2			EDU1351SD #5
9	edu1351sd	0.5	1	154.0	50.0	16.2	121.2	1563.2	EDU1351SD #5
10	edu1351sd	0.0	4	174.0	30.0	11.0			EDU1351SD #3
11	edu1351sd	0.0	1	174.0	42.0	19.0			EDU1351SD #8
12	edu1351sd	0.5	2	174.0	42.0	19.0	115.0	1557.0	EDU1351SD #8
13	edu1351sd	0.5	1	174.0	42.0	19.0	42.0	64.5	EDU1351SD #7
14	edu1351sd	0.0	4	74.0	90.0	3.0			EDU1351SD #292
15	edu1351sd	0.0	4	74.0	90.0	3.0			EDU1351SD #266
16	edu1351sd	0.5	6	74.0	90.0	3.0	110.0	1552.0	EDU1351SD #266
17	edu1351sd	0.0	1	74.0	90.0	3.0			EDU1351SD #267
18	edu1351sd	0.5	3	74.0	90.0	3.0	107.0	1549.0	EDU1351SD #267
19	edu1351sd	0.0	8	74.0	120.0	3.0			EDU1351SD #38
20	edu1351sd	0.0	4	74.0	120.0	3.0			EDU1351SD #41
21	edu1351sd	0.0	7	74.0	120.0	3.0			EDU1351SD #42
22	edu1351sd	0.5	1	74.0	120.0	3.0	142.0	1584.0	EDU1351SD #43
23	edu1351sd	0.0	1	74.0	120.0	3.0			EDU1351SD #44
24	edu1351sd	0.5	1	74.0	120.0	3.0	139.0	1581.0	EDU1351SD #44
25	edu1351sd	0.5	2	74.0	120.0	3.0	139.0	1581.0	EDU1351SD #45

26	edul351sd	0.0	2	74.0	120.0	3.0			EDU1351SD #46
27	edul351sd	0.5	2	74.0	120.0	3.0	136.0	1578.0	EDU1351SD #46
28	edul351sd	0.0	1	74.0	120.0	3.0			EDU1351SD #47
29	edul351sd	0.5	2	74.0	120.0	3.0	134.0	1576.0	EDU1351SD #47
30	edul351sd	0.5	1	74.0	120.0	3.0	134.0	1576.0	EDU1351SD #48
31	edul351sd	0.0	5	84.0	85.0	3.4			EDU1351SD #348
32	edul351sd	0.5	2	84.0	85.0	3.4	111.4	1553.4	EDU1351SD #348
33	edul351sd	0.5	1	84.0	85.0	3.4	111.4	1553.4	EDU1351SD #349
34	edul351sd	0.0	2	84.0	85.0	3.4			EDU1351SD #302
35	edul351sd	0.5	2	84.0	85.0	3.4	108.4	1550.4	EDU1351SD #302
36	edul351sd	0.0	7	84.0	115.0	3.4			EDU1351SD #34
37	edul351sd	0.5	1	84.0	115.0	3.4	170.4	1612.4	EDU1351SD #34
38	edul351sd	0.0	3	84.0	115.0	3.4			EDU1351SD #301
39	edul351sd	0.5	1	84.0	115.0	3.4	153.4	1595.4	EDU1351SD #301
40	edul351sd	0.0	4	94.0	60.0	3.8			EDU1351SD #123
41	edul351sd	0.0	2	94.0	60.0	3.8			EDU1351SD #124
42	edul351sd	0.5	2	94.0	60.0	3.8	72.8	1514.8	EDU1351SD #125
43	edul351sd	0.0	2	94.0	60.0	3.8			EDU1351SD #126
44	edul351sd	0.5	2	94.0	60.0	3.8	69.8	1511.8	EDU1351SD #126
45	edul351sd	0.0	3	94.0	75.0	3.8			EDU1351SD #140
46	edul351sd	0.5	1	94.0	75.0	3.8	97.8	1539.8	EDU1351SD #141
47	edul351sd	0.0	6	94.0	95.0	3.8			EDU1351SD #33
48	edul351sd	0.5	2	94.0	95.0	3.8	152.8	1594.8	EDU1351SD #33
49	edul351sd	0.0	3	94.0	95.0	3.8			EDU1351SD #142
50	edul351sd	0.5	1	94.0	95.0	3.8	125.8	1567.8	EDU1351SD #142
51	edul351sd	0.0	2	94.0	130.0	3.8			EDU1351SD #127
52	edul351sd	0.5	2	94.0	130.0	3.8	176.8	1618.8	EDU1351SD #127
53	edul351sd	0.0	2	94.0	130.0	3.8			EDU1351SD #136
54	edul351sd	0.5	2	94.0	130.0	3.8	173.8	1615.8	EDU1351SD #136
55	edul351sd	0.0	4	94.0	130.0	3.8			EDU1351SD #137
56	edul351sd	0.0	2	94.0	130.0	3.8			EDU1351SD #138



57	edul351sd	0.5	1	94.0	130.0	3.8	167.8	1609.8	EDU1351SD #138
58	edul351sd	0.5	1	94.0	130.0	3.8	167.8	1609.8	EDU1351SD #139
59	edul351sd	0.0	4	104.0	26.0	4.2			EDU1351SD #293
60	edul351sd	0.0	1	104.0	28.0	4.2			EDU1351SD #283
61	edul351sd	0.5	3	104.0	28.0	4.2	38.2	1480.2	EDU1351SD #283
62	edul351sd	0.0	2	104.0	30.0	4.2			EDU1351SD #271
63	edul351sd	0.5	2	104.0	30.0	4.2	40.2	1482.2	EDU1351SD #271
64	edul351sd	0.0	2	104.0	40.0	4.2			EDU1351SD #129
65	edul351sd	0.5	1	104.0	40.0	4.2	50.2	1492.2	EDU1351SD #129
66	edul351sd	0.5	1	104.0	40.0	4.2	50.2	1492.2	EDU1351SD #130
67	edul351sd	0.0	4	104.0	50.0	4.2			EDU1351SD #237
68	edul351sd	0.0	5	104.0	60.0	4.2			EDU1351SD #52
69	edul351sd	0.5	3	104.0	60.0	4.2	101.2	1543.2	EDU1351SD #52
70	edul351sd	0.5	2	104.0	60.0	4.2	94.2	1536.2	EDU1351SD #53
71	edul351sd	0.5	2	104.0	60.0	4.2	94.2	1536.2	EDU1351SD #54
72	edul351sd	0.0	2	104.0	60.0	4.2			EDU1351SD #55
73	edul351sd	0.5	2	104.0	60.0	4.2	88.2	1530.2	EDU1351SD #55
74	edul351sd	0.0	4	104.0	60.0	4.2			EDU1351SD #56
75	edul351sd	0.0	8	104.0	60.0	4.2			EDU1351SD #57
76	edul351sd	0.0	3	104.0	60.0	4.2			EDU1351SD #58
77	edul351sd	0.5	1	104.0	60.0	4.2	77.2	1519.2	EDU1351SD #59
78	edul351sd	0.0	2	104.0	60.0	4.2			EDU1351SD #60
79	edul351sd	0.5	1	104.0	60.0	4.2	75.2	1517.2	EDU1351SD #60
80	edul351sd	0.5	1	104.0	60.0	4.2	75.2	1517.2	EDU1351SD #61
81	edul351sd	0.0	2	104.0	60.0	4.2			EDU1351SD #62
82	edul351sd	0.5	1	104.0	60.0	4.2	73.2	1515.2	EDU1351SD #62
83	edul351sd	0.5	1	104.0	60.0	4.2	73.2	1515.2	EDU1351SD #63
84	edul351sd	0.0	6	104.0	75.0	4.2			EDU1351SD #70
85	edul351sd	0.5	1	104.0	75.0	4.2	102.2	1544.2	EDU1351SD #70
86	edul351sd	0.0	1	104.0	75.0	4.2			EDU1351SD #71
87	edul351sd	0.0	3	104.0	75.0	4.2			EDU1351SD #72

88	edu1351sd	0.0	3	104.0	75.0	4.2			EDU1351SD #73
89	edu1351sd	0.5	1	104.0	75.0	4.2	96.2	1538.2	EDU1351SD #74
90	edu1351sd	0.0	1	104.0	75.0	4.2			EDU1351SD #75
91	edu1351sd	0.5	1	104.0	75.0	4.2	94.2	1536.2	EDU1351SD #76
92	edu1351sd	0.5	1	104.0	75.0	4.2	94.2	1536.2	EDU1351SD #77
93	edu1351sd	1.0	1	104.0	75.0	4.2	94.2	1536.2	EDU1351SD #78
94	edu1351sd	0.0	8	104.0	85.0	4.2			EDU1351SD #32
95	edu1351sd	0.0	4	104.0	85.0	4.2			EDU1351SD #64
96	edu1351sd	0.0	8	104.0	85.0	4.2			EDU1351SD #65
97	edu1351sd	0.0	2	104.0	85.0	4.2			EDU1351SD #84
98	edu1351sd	0.5	1	104.0	85.0	4.2	112.2	1554.2	EDU1351SD #84
99	edu1351sd	0.5	1	104.0	85.0	4.2	112.2	1554.2	EDU1351SD #85
100	edu1351sd	0.0	1	104.0	85.0	4.2			EDU1351SD #68
101	edu1351sd	0.5	2	104.0	85.0	4.2	109.2	1551.2	EDU1351SD #68
102	edu1351sd	1.0	1	104.0	85.0	4.2	109.2	1551.2	EDU1351SD #69
103	edu1351sd	0.0	4	104.0	100.0	4.2			EDU1351SD #85
104	edu1351sd	0.0	3	104.0	120.0	4.2			EDU1351SD #79
105	edu1351sd	0.5	1	104.0	120.0	4.2	178.2	1620.2	EDU1351SD #79
106	edu1351sd	0.0	8	104.0	120.0	4.2			EDU1351SD #80
107	edu1351sd	0.0	2	104.0	120.0	4.2			EDU1351SD #81
108	edu1351sd	0.0	2	104.0	120.0	4.2			EDU1351SD #82
109	edu1351sd	0.0	1	104.0	120.0	4.2			EDU1351SD #83
110	edu1351sd	0.5	3	104.0	120.0	4.2	169.2	1611.2	EDU1351SD #83
111	edu1351sd	0.0	3	104.0	120.0	4.2			EDU1351SD #66
112	edu1351sd	0.5	1	104.0	120.0	4.2	175.2	1617.2	EDU1351SD #67
113	edu1351sd	0.0	2	114.0	40.0	4.6			EDU1351SD #149
114	edu1351sd	0.5	2	114.0	55.0	4.6	79.6	1521.6	EDU1351SD #121
115	edu1351sd	0.0	1	114.0	55.0	4.6			EDU1351SD #122
116	edu1351sd	0.5	1	114.0	55.0	4.6	78.6	1520.6	EDU1351SD #122
117	edu1351sd	0.0	4	114.0	55.0	4.6			EDU1351SD #147
118	edu1351sd	0.0	2	114.0	55.0	4.6			EDU1351SD #148

119	edul351sd	0.5	1	114.0	55.0	4.6	72.6	1514.6	EDU1351SD #148
120	edul351sd	1.0	1	114.0	55.0	4.6	72.6	1514.6	EDU1351SD #148
121	edul351sd	0.0	8	114.0	75.0	4.6			EDU1351SD #31
122	edul351sd	0.0	4	114.0	75.0	4.6			EDU1351SD #300
123	edul351sd	0.0	5	114.0	75.0	4.6			EDU1351SD #150
124	edul351sd	0.5	5	114.0	75.0	4.6	114.6	1556.6	EDU1351SD #150
125	edul351sd	0.0	4	114.0	90.0	6.6			EDU1351SD #373
126	edul351sd	0.0	4	114.0	90.0	6.6			EDU1351SD #238
127	edul351sd	0.0	2	114.0	105.0	10.6			EDU1351SD #299
128	edul351sd	0.5	2	114.0	105.0	10.6	170.6	1612.6	EDU1351SD #299
129	edul351sd	0.5	4	114.0	105.0	10.6	165.6	1607.6	EDU1351SD #265
130	edul351sd	0.0	2	114.0	105.0	10.6			EDU1351SD #144
131	edul351sd	0.0	3	114.0	105.0	10.6			EDU1351SD #145
132	edul351sd	1.0	1	114.0	105.0	10.6	158.6	1600.6	EDU1351SD #145
133	edul351sd	0.0	4	114.0	105.0	6.6			EDU1351SD #143
134	edul351sd	0.0	3	114.0	110.0	16.6			EDU1351SD #369
135	edul351sd	0.5	1	114.0	110.0	16.6	184.6	1626.6	EDU1351SD #369
136	edul351sd	0.0	4	124.0	45.0	5.0			EDU1351SD #108
137	edul351sd	0.0	3	124.0	45.0	5.0			EDU1351SD #109
138	edul351sd	0.5	1	124.0	45.0	5.0	69.0	1511.0	EDU1351SD #109
139	edul351sd	0.0	4	124.0	45.0	5.0			EDU1351SD #110
140	edul351sd	0.0	3	124.0	45.0	5.0			EDU1351SD #111
141	edul351sd	0.5	1	124.0	45.0	5.0	63.0	1505.0	EDU1351SD #112
142	edul351sd	0.0	3	124.0	45.0	5.0			EDU1351SD #113
143	edul351sd	0.5	1	124.0	45.0	5.0	60.0	1502.0	EDU1351SD #113
144	edul351sd	0.0	8	124.0	65.0	8.0			EDU1351SD #30
145	edul351sd	0.5	4	124.0	65.0	8.0	112.0	1554.0	EDU1351SD #294
146	edul351sd	0.5	3	124.0	65.0	8.0	107.0	1549.0	EDU1351SD #261
147	edul351sd	0.5	1	124.0	65.0	8.0	107.0	1549.0	EDU1351SD #262
148	edul351sd	0.0	1	124.0	65.0	8.0			EDU1351SD #119
149	edul351sd	0.5	2	124.0	65.0	8.0	104.0	1546.0	EDU1351SD #119

150	edu1351sd	0.5	1	124.0	65.0	8.0	104.0	1546.0	EDU1351SD #120
151	edu1351sd	0.0	2	124.0	80.0	10.0			EDU1351SD #371
152	edu1351sd	0.0	4	124.0	80.0	10.0			EDU1351SD #240
153	edu1351sd	0.0	1	124.0	100.0	26.0			EDU1351SD #298
154	edu1351sd	0.5	3	124.0	100.0	26.0	183.0	1625.0	EDU1351SD #298
155	edu1351sd	0.0	3	124.0	100.0	23.0			EDU1351SD #263
156	edu1351sd	1.0	1	124.0	100.0	23.0	175.0	1617.0	EDU1351SD #264
157	edu1351sd	0.0	4	124.0	100.0	23.0			EDU1351SD #114
158	edu1351sd	0.0	2	124.0	100.0	23.0			EDU1351SD #115
159	edu1351sd	0.5	1	124.0	100.0	23.0	170.0	1612.0	EDU1351SD #115
160	edu1351sd	0.5	1	124.0	100.0	23.0	170.0	1612.0	EDU1351SD #116
161	edu1351sd	0.0	1	124.0	100.0	23.0			EDU1351SD #117
162	edu1351sd	0.5	2	124.0	100.0	23.0	167.0	1609.0	EDU1351SD #117
163	edu1351sd	0.5	1	124.0	100.0	23.0	167.0	1609.0	EDU1351SD #118
164	edu1351sd	0.0	4	134.0	30.0	5.4			EDU1351SD #244
165	edu1351sd	0.0	4	134.0	35.0	5.4			EDU1351SD #87
166	edu1351sd	0.0	4	134.0	35.0	5.4			EDU1351SD #92
167	edu1351sd	0.0	3	134.0	35.0	5.4			EDU1351SD #88
168	edu1351sd	0.5	1	134.0	35.0	5.4	53.4	1495.4	EDU1351SD #89
169	edu1351sd	0.0	3	134.0	35.0	5.4			EDU1351SD #90
170	edu1351sd	0.5	1	134.0	35.0	5.4	51.4	1493.4	EDU1351SD #90
171	edu1351sd	0.0	3	134.0	35.0	5.4			EDU1351SD #91
172	edu1351sd	0.5	1	134.0	35.0	5.4	49.4	1491.4	EDU1351SD #91
173	edu1351sd	0.0	7	134.0	52.0	9.4			EDU1351SD #105
174	edu1351sd	0.5	1	134.0	52.0	9.4	88.4	1530.4	EDU1351SD #105
175	edu1351sd	0.0	8	134.0	60.0	10.4			EDU1351SD #29
176	edu1351sd	0.0	2	134.0	60.0	10.4			EDU1351SD #106
177	edu1351sd	0.5	1	134.0	60.0	10.4	102.4	1544.4	EDU1351SD #106
178	edu1351sd	0.5	1	134.0	60.0	10.4	102.4	1544.4	EDU1351SD #107
179	edu1351sd	0.0	3	134.0	60.0	10.4			EDU1351SD #101
180	edu1351sd	0.5	1	134.0	60.0	10.4	100.4	1542.4	EDU1351SD #101

181	edul351sd	0.5	1	134.0	60.0	10.4	94.4	1536.4	EDU1351SD #102
182	edul351sd	1.0	1	134.0	60.0	10.4	94.4	1536.4	EDU1351SD #102
183	edul351sd	0.5	1	134.0	60.0	10.4	94.4	1536.4	EDU1351SD #103
184	edul351sd	1.0	1	134.0	60.0	10.4	94.4	1536.4	EDU1351SD #104
185	edul351sd	0.0	4	134.0	90.0	27.4			EDU1351SD #93
186	edul351sd	0.0	4	134.0	90.0	27.4			EDU1351SD #94
187	edul351sd	0.0	5	134.0	90.0	27.4			EDU1351SD #95
188	edul351sd	0.5	1	134.0	90.0	27.4	167.4	1609.4	EDU1351SD #95
189	edul351sd	0.0	1	134.0	90.0	27.4			EDU1351SD #96
190	edul351sd	0.5	1	134.0	90.0	27.4	164.4	1606.4	EDU1351SD #96
191	edul351sd	0.0	1	134.0	90.0	27.4			EDU1351SD #97
192	edul351sd	0.5	1	134.0	90.0	27.4	161.4	1603.4	EDU1351SD #98
193	edul351sd	0.0	1	134.0	90.0	27.4			EDU1351SD #99
194	edul351sd	0.5	1	134.0	90.0	27.4	158.4	1600.4	EDU1351SD #99
195	edul351sd	0.0	2	134.0	90.0	27.4			EDU1351SD #994
196	edul351sd	0.0	1	144.0	30.0	5.8			EDU1351SD #229
197	edul351sd	0.5	1	144.0	30.0	5.8	50.8	1492.8	EDU1351SD #229
198	edul351sd	0.0	4	144.0	30.0	5.8			EDU1351SD #230
199	edul351sd	0.0	4	144.0	30.0	5.8			EDU1351SD #232
200	edul351sd	0.0	4	144.0	45.0	9.8			EDU1351SD #241
201	edul351sd	0.0	4	144.0	45.0	9.8			EDU1351SD #242
202	edul351sd	0.0	4	144.0	45.0	9.8			EDU1351SD #243
203	edul351sd	0.0	8	144.0	55.0	12.8			EDU1351SD #28
204	edul351sd	0.0	4	144.0	55.0	12.8			EDU1351SD #303
205	edul351sd	0.0	4	144.0	65.0	15.8			EDU1351SD #245
206	edul351sd	0.0	4	144.0	65.0	15.8			EDU1351SD #246
207	edul351sd	0.0	2	144.0	65.0	15.8			EDU1351SD #247
208	edul351sd	0.5	1	144.0	65.0	15.8	122.8	1564.8	EDU1351SD #247
209	edul351sd	0.5	1	144.0	65.0	15.8	122.8	1564.8	EDU1351SD #248
210	edul351sd	0.0	2	144.0	65.0	15.8			EDU1351SD #249
211	edul351sd	0.5	1	144.0	65.0	15.8	119.8	1561.8	EDU1351SD #249

212	edu1351sd	0.5	1	144.0	65.0	15.8	119.8	1561.8	EDU1351SD #250
213	edu1351sd	0.0	1	144.0	70.0	21.8			EDU1351SD #251
214	edu1351sd	0.5	3	144.0	70.0	21.8	143.8	1585.8	EDU1351SD #251
215	edu1351sd	0.0	1	144.0	70.0	18.8			EDU1351SD #239
216	edu1351sd	0.5	1	144.0	70.0	18.8	144.8	1586.8	EDU1351SD #239
217	edu1351sd	0.0	3	144.0	70.0	18.8			EDU1351SD #233
218	edu1351sd	0.5	1	144.0	70.0	18.8	138.8	1580.8	EDU1351SD #234
219	edu1351sd	0.0	3	144.0	70.0	18.8			EDU1351SD #235
220	edu1351sd	1.0	1	144.0	70.0	18.8	135.8	1577.8	EDU1351SD #236
221	edu1351sd	0.0	4	154.0	25.0	6.2			EDU1351SD #345
222	edu1351sd	0.0	4	154.0	30.0	6.2			EDU1351SD #23
223	edu1351sd	0.0	4	154.0	30.0	6.2			EDU1351SD #156
224	edu1351sd	0.0	4	154.0	30.0	6.2			EDU1351SD #157
225	edu1351sd	0.0	2	154.0	30.0	6.2			EDU1351SD #158
226	edu1351sd	0.5	1	154.0	30.0	6.2	49.2	1491.2	EDU1351SD #159
227	edu1351sd	1.0	1	154.0	30.0	6.2	49.2	1491.2	EDU1351SD #160
228	edu1351sd	0.0	4	154.0	35.0	9.2			EDU1351SD #366
229	edu1351sd	0.0	4	154.0	38.0	11.2			EDU1351SD #181
230	edu1351sd	0.0	4	154.0	40.0	15.2			EDU1351SD #362
231	edu1351sd	0.0	3	154.0	40.0	14.2			EDU1351SD #344
232	edu1351sd	0.5	1	154.0	40.0	14.2	84.2	1526.2	EDU1351SD #344
233	edu1351sd	0.0	3	154.0	40.0	11.2			EDU1351SD #189
234	edu1351sd	0.5	1	154.0	40.0	11.2	40.0	54.7	EDU1351SD #189
235	edu1351sd	0.0	2	154.0	40.0	11.2			EDU1351SD #193
236	edu1351sd	0.0	1	154.0	40.0	11.2			EDU1351SD #194
237	edu1351sd	0.5	1	154.0	40.0	11.2	75.2	1517.2	EDU1351SD #194
238	edu1351sd	0.0	4	154.0	45.0	18.2			EDU1351SD #370
239	edu1351sd	0.0	4	154.0	50.0	21.2			EDU1351SD #363
240	edu1351sd	0.0	4	154.0	50.0	20.2			EDU1351SD #357
241	edu1351sd	0.0	4	154.0	50.0	18.2			EDU1351SD #356
242	edu1351sd	0.0	7	154.0	50.0	17.2			EDU1351SD #306

243	edu1351sd	0.5	1	154.0	50.0	17.2	110.2	1552.2	EDU1351SD #307
244	edu1351sd	0.0	1	154.0	50.0	15.2			EDU1351SD #304
245	edu1351sd	0.5	1	154.0	50.0	15.2	106.2	1548.2	EDU1351SD #304
246	edu1351sd	0.0	1	154.0	50.0	15.2			EDU1351SD #305
247	edu1351sd	0.5	1	154.0	50.0	15.2	106.2	1548.2	EDU1351SD #305
248	edu1351sd	0.0	4	154.0	50.0	14.2			EDU1351SD #161
249	edu1351sd	0.5	2	154.0	50.0	14.2	97.2	1539.2	EDU1351SD #190
250	edu1351sd	0.0	1	154.0	50.0	14.2			EDU1351SD #191
251	edu1351sd	1.0	1	154.0	50.0	14.2	97.2	1539.2	EDU1351SD #192
252	edu1351sd	0.0	3	154.0	50.0	14.2			EDU1351SD #162
253	edu1351sd	0.5	1	154.0	50.0	14.2	94.2	1536.2	EDU1351SD #162
254	edu1351sd	0.0	4	154.0	55.0	25.2			EDU1351SD #372
255	edu1351sd	0.0	3	154.0	55.0	23.2			EDU1351SD #364
256	edu1351sd	0.0	1	154.0	55.0	23.2			EDU1351SD #365
257	edu1351sd	0.0	3	154.0	55.0	24.2			EDU1351SD #367
258	edu1351sd	0.0	1	154.0	55.0	24.2			EDU1351SD #368
259	edu1351sd	0.0	3	154.0	65.0	31.2			EDU1351SD #165
260	edu1351sd	0.0	1	154.0	65.0	31.2			EDU1351SD #165
261	edu1351sd	0.0	3	154.0	65.0	26.2			EDU1351SD #163
262	edu1351sd	0.5	1	154.0	65.0	26.2	135.2	1577.2	EDU1351SD #164
263	edu1351sd	0.0	4	154.0	65.0	26.2			EDU1351SD #175
264	edu1351sd	0.0	4	154.0	65.0	25.2			EDU1351SD #173
265	edu1351sd	0.0	3	154.0	65.0	25.2			EDU1351SD #174
266	edu1351sd	0.5	1	154.0	65.0	25.2	139.2	1581.2	EDU1351SD #175
267	edu1351sd	0.0	4	154.0	80.0	56.2			EDU1351SD #182
268	edu1351sd	0.0	3	154.0	80.0	56.2			EDU1351SD #183
269	edu1351sd	0.0	1	154.0	80.0	56.2			EDU1351SD #184
270	edu1351sd	0.0	2	154.0	80.0	48.2			EDU1351SD #185
271	edu1351sd	0.5	1	154.0	80.0	48.2	182.2	1624.2	EDU1351SD #186
272	edu1351sd	1.0	1	154.0	80.0	48.2	182.2	1624.2	EDU1351SD #187
273	edu1351sd	0.0	3	164.0	20.0	6.6			EDU1351SD #295

274	edu1351sd	0.5	1	164.0	20.0	6.6	40.6	1482.6	EDU1351SD #296
275	edu1351sd	0.0	4	164.0	25.0	6.6			EDU1351SD #226
276	edu1351sd	0.5	1	164.0	25.0	6.6	46.6	1488.6	EDU1351SD #226
277	edu1351sd	0.5	1	164.0	25.0	6.6	46.6	1488.6	EDU1351SD #227
278	edu1351sd	0.0	3	164.0	25.0	6.6			EDU1351SD #228
279	edu1351sd	0.5	1	164.0	25.0	6.6	44.6	1486.6	EDU1351SD #228
280	edu1351sd	0.0	4	164.0	25.0	6.6			EDU1351SD #231
281	edu1351sd	0.0	4	164.0	30.0	8.6			EDU1351SD #43
282	edu1351sd	0.0	6	164.0	34.0	10.6			EDU1351SD #24
283	edu1351sd	0.0	4	164.0	34.0	10.6			EDU1351SD #212
284	edu1351sd	0.0	4	164.0	34.0	10.6			EDU1351SD #213
285	edu1351sd	0.0	1	164.0	34.0	10.6			EDU1351SD #214
286	edu1351sd	0.5	1	164.0	34.0	10.6	62.6	1504.6	EDU1351SD #214
287	edu1351sd	0.5	1	164.0	34.0	10.6	62.6	1504.6	EDU1351SD #215
288	edu1351sd	0.5	1	164.0	34.0	10.6	62.6	1504.6	EDU1351SD #216
289	edu1351sd	0.0	4	164.0	35.0	16.6			EDU1351SD #361
290	edu1351sd	0.0	1	164.0	35.0	15.6			EDU1351SD #358
291	edu1351sd	0.5	1	164.0	35.0	15.6	78.6	1520.6	EDU1351SD #358
292	edu1351sd	0.5	1	164.0	35.0	15.6	78.6	1520.6	EDU1351SD #359
293	edu1351sd	0.5	1	164.0	35.0	15.6	78.6	1520.6	EDU1351SD #360
294	edu1351sd	0.0	4	164.0	35.0	15.6			EDU1351SD #355
295	edu1351sd	0.0	4	164.0	35.0	14.6			EDU1351SD #332
296	edu1351sd	0.0	2	164.0	35.0	11.6			EDU1351SD #331
297	edu1351sd	0.5	2	164.0	35.0	11.6	76.6	1518.6	EDU1351SD #331
298	edu1351sd	0.0	4	164.0	40.0	25.6			EDU1351SD #321
299	edu1351sd	0.0	1	164.0	40.0	23.6			EDU1351SD #346
300	edu1351sd	0.5	2	164.0	40.0	23.6	97.6	1539.6	EDU1351SD #346
301	edu1351sd	0.5	1	164.0	40.0	23.6	97.6	1539.6	EDU1351SD #347
302	edu1351sd	0.0	3	164.0	40.0	22.6			EDU1351SD #319
303	edu1351sd	0.5	1	164.0	40.0	22.6	96.6	1538.6	EDU1351SD #320
304	edu1351sd	0.0	2	164.0	40.0	22.6			EDU1351SD #336



305	edu1351sd	0.5	1	164.0	40.0	22.6	96.6	1538.6	EDU1351SD #337
306	edu1351sd	0.5	1	164.0	40.0	22.6	96.6	1538.6	EDU1351SD #338
307	edu1351sd	0.0	3	164.0	40.0	22.6			EDU1351SD #350
308	edu1351sd	0.5	1	164.0	40.0	22.6	98.6	1540.6	EDU1351SD #350
309	edu1351sd	0.0	1	164.0	40.0	20.6			EDU1351SD #334
310	edu1351sd	0.5	1	164.0	40.0	20.6	96.6	1538.6	EDU1351SD #334
311	edu1351sd	1.0	1	164.0	40.0	20.6	96.6	1538.6	EDU1351SD #335
312	edu1351sd	0.0	2	164.0	40.0	17.6			EDU1351SD #317
313	edu1351sd	0.0	2	164.0	40.0	17.6			EDU1351SD #318
314	edu1351sd	0.0	4	164.0	40.0	13.6			EDU1351SD #225
315	edu1351sd	0.0	2	164.0	40.0	13.6			EDU1351SD #223
316	edu1351sd	0.5	1	164.0	40.0	13.6	76.6	1518.6	EDU1351SD #223
317	edu1351sd	0.5	1	164.0	40.0	13.6	76.6	1518.6	EDU1351SD #224
318	edu1351sd	0.0	2	164.0	45.0	27.6			EDU1351SD #327
319	edu1351sd	0.5	2	164.0	45.0	27.6	116.6	1558.6	EDU1351SD #328
320	edu1351sd	0.0	1	164.0	45.0	27.6			EDU1351SD #323
321	edu1351sd	0.5	2	164.0	45.0	27.6	114.6	1556.6	EDU1351SD #323
322	edu1351sd	0.0	1	164.0	45.0	27.6			EDU1351SD #324
323	edu1351sd	0.0	3	164.0	45.0	27.6			EDU1351SD #329
324	edu1351sd	0.5	1	164.0	45.0	27.6	114.6	1556.6	EDU1351SD #329
325	edu1351sd	0.0	2	164.0	45.0	17.6			EDU1351SD #250
326	edu1351sd	0.5	2	164.0	45.0	17.6	102.6	1544.6	EDU1351SD #250
327	edu1351sd	0.0	5	164.0	45.0	15.6			EDU1351SD #25
328	edu1351sd	0.5	1	164.0	45.0	15.6	114.6	1556.6	EDU1351SD #25
329	edu1351sd	0.5	1	164.0	45.0	15.6	114.6	1556.6	EDU1351SD #26
330	edu1351sd	1.0	1	164.0	45.0	15.6	45.0	64.1	EDU1351SD #27
331	edu1351sd	0.0	4	164.0	45.0	15.6			EDU1351SD #217
332	edu1351sd	0.0	4	164.0	45.0	15.6			EDU1351SD #218
333	edu1351sd	0.0	4	164.0	45.0	15.6			EDU1351SD #219
334	edu1351sd	0.0	3	164.0	45.0	15.6			EDU1351SD #220
335	edu1351sd	0.5	1	164.0	45.0	15.6	85.6	1527.6	EDU1351SD #220

336	edu1351sd	0.0	2	164.0	45.0	15.6			EDU1351SD #221
337	edu1351sd	0.5	1	164.0	45.0	15.6	83.6	1525.6	EDU1351SD #221
338	edu1351sd	0.5	1	164.0	45.0	15.6	83.6	1525.6	EDU1351SD #222
339	edu1351sd	0.0	4	174.0	20.0	7.0			EDU1351SD #200
340	edu1351sd	0.0	4	174.0	25.0	7.0			EDU1351SD #335
341	edu1351sd	0.0	3	174.0	30.0	15.0			EDU1351SD #351
342	edu1351sd	0.5	1	174.0	30.0	15.0	72.0	1514.0	EDU1351SD #352
343	edu1351sd	0.0	4	174.0	30.0	15.0			EDU1351SD #353
344	edu1351sd	0.0	2	174.0	30.0	14.0			EDU1351SD #340
345	edu1351sd	0.5	1	174.0	30.0	14.0	71.0	1513.0	EDU1351SD #341
346	edu1351sd	0.5	1	174.0	30.0	14.0	30.0	47.5	EDU1351SD #342
347	edu1351sd	0.0	4	174.0	30.0	11.0			EDU1351SD #167
348	edu1351sd	0.0	3	174.0	30.0	11.0			EDU1351SD #170
349	edu1351sd	0.5	1	174.0	30.0	11.0	61.0	1503.0	EDU1351SD #170
350	edu1351sd	0.0	1	174.0	30.0	11.0			EDU1351SD #171
351	edu1351sd	1.0	1	174.0	30.0	11.0	58.0	1500.0	EDU1351SD #171
352	edu1351sd	0.0	2	174.0	30.0	11.0			EDU1351SD #172
353	edu1351sd	0.0	4	174.0	35.0	25.0			EDU1351SD #316
354	edu1351sd	0.0	4	174.0	35.0	22.0			EDU1351SD #354
355	edu1351sd	0.0	4	174.0	35.0	21.0			EDU1351SD #333
356	edu1351sd	0.0	2	174.0	35.0	18.0			EDU1351SD #201
357	edu1351sd	0.5	1	174.0	35.0	18.0	87.0	1529.0	EDU1351SD #202
358	edu1351sd	1.0	1	174.0	35.0	18.0	87.0	1529.0	EDU1351SD #203
359	edu1351sd	0.0	4	174.0	35.0	14.0			EDU1351SD #313
360	edu1351sd	0.0	4	174.0	40.0	37.0			EDU1351SD #211
361	edu1351sd	0.0	3	174.0	40.0	29.0			EDU1351SD #322
362	edu1351sd	0.5	1	174.0	40.0	29.0	109.0	1551.0	EDU1351SD #322
363	edu1351sd	0.0	3	174.0	40.0	29.0			EDU1351SD #325
364	edu1351sd	0.0	1	174.0	40.0	29.0			EDU1351SD #326
365	edu1351sd	0.0	4	174.0	40.0	29.0			EDU1351SD #330
366	edu1351sd	0.5	4	174.0	40.0	29.0	107.0	1549.0	EDU1351SD #310

367	edul351sd	0.5	2	174.0	40.0	28.0	106.0	1548.0	EDU1351SD #312
368	edul351sd	0.0	2	174.0	40.0	28.0			EDU1351SD #311
369	edul351sd	0.0	3	174.0	40.0	25.0			EDU1351SD #206
370	edul351sd	1.0	1	174.0	40.0	25.0	104.0	1546.0	EDU1351SD #207
371	edul351sd	0.0	1	174.0	40.0	25.0			EDU1351SD #208
372	edul351sd	0.5	1	174.0	40.0	25.0	101.0	1543.0	EDU1351SD #208
373	edul351sd	0.0	1	174.0	40.0	25.0			EDU1351SD #209
374	edul351sd	0.0	1	174.0	40.0	25.0			EDU1351SD #210
375	edul351sd	0.0	3	174.0	40.0	24.0			EDU1351SD #204
376	edul351sd	1.0	1	174.0	40.0	24.0	97.0	1539.0	EDU1351SD #205
377	edul351sd	0.0	3	174.0	40.0	23.0			EDU1351SD #308
378	edul351sd	0.5	1	174.0	40.0	23.0	103.0	1545.0	EDU1351SD #309
379	edul351sd	0.0	4	174.0	40.0	20.0			EDU1351SD #178
380	edul351sd	0.0	3	174.0	40.0	20.0			EDU1351SD #180
381	edul351sd	0.5	1	174.0	40.0	20.0	93.0	1535.0	EDU1351SD #180
382	edul351sd	0.0	3	174.0	40.0	19.0			EDU1351SD #252
383	edul351sd	0.5	1	174.0	40.0	19.0	98.0	1540.0	EDU1351SD #253
384	edul351sd	0.0	1	174.0	40.0	18.0			EDU1351SD #314
385	edul351sd	0.5	1	174.0	40.0	18.0	92.0	1534.0	EDU1351SD #314
386	edul351sd	0.0	1	174.0	40.0	18.0			EDU1351SD #315
387	edul351sd	0.5	1	174.0	40.0	18.0	92.0	1534.0	EDU1351SD #315
388	edul351sd	0.0	7	174.0	40.0	17.0			EDU1351SD #39
389	edul351sd	0.0	1	174.0	40.0	17.0			EDU1351SD #40
390	edul351sd	0.0	3	174.0	40.0	17.0			EDU1351SD #198
391	edul351sd	0.0	1	174.0	40.0	17.0			EDU1351SD #199
392	edul351sd	0.0	1	174.0	40.0	17.0			EDU1351SD #195
393	edul351sd	0.5	1	174.0	40.0	17.0	88.0	1530.0	EDU1351SD #195
394	edul351sd	0.0	1	174.0	40.0	17.0			EDU1351SD #196
395	edul351sd	0.0	1	174.0	40.0	17.0			EDU1351SD #197
396	edul351sd	0.0	4	174.0	42.0	19.0			EDU1351SD #6
397	edul351sd	0.0	4	189.0	17.0	7.6			EDU1351SD #260

398	edul351sd	0.0	2	189.0	18.0	7.6			EDU1351SD #257
399	edul351sd	0.5	2	189.0	18.0	7.6	44.6	1486.6	EDU1351SD #258
400	edul351sd	0.0	4	189.0	21.0	7.6			EDU1351SD #259
401	edul351sd	0.0	4	189.0	21.0	7.6			EDU1351SD #268
402	edul351sd	0.0	4	189.0	26.0	16.6			EDU1351SD #152
403	edul351sd	0.0	4	189.0	26.0	14.6			EDU1351SD #153
404	edul351sd	0.0	5	189.0	26.0	12.6			EDU1351SD #19
405	edul351sd	0.5	1	189.0	26.0	12.6	78.6	1520.6	EDU1351SD #20
406	edul351sd	1.0	1	189.0	26.0	12.6	78.6	1520.6	EDU1351SD #21
407	edul351sd	0.5	1	189.0	26.0	12.6	78.6	1520.6	EDU1351SD #22
408	edul351sd	0.0	4	189.0	26.0	12.6			EDU1351SD #54
409	edul351sd	0.0	5	189.0	38.0	19.6			EDU1351SD #9
410	edul351sd	0.5	1	189.0	38.0	19.6	111.6	1553.6	EDU1351SD #10
411	edul351sd	0.5	1	189.0	38.0	19.6	111.6	1553.6	EDU1351SD #11
412	edul351sd	1.0	1	189.0	38.0	19.6	111.6	1553.6	EDU1351SD #12
413	edul351sd	0.0	2	189.0	38.0	19.6			EDU1351SD #14
414	edul351sd	0.5	1	189.0	38.0	19.6	112.6	1554.6	EDU1351SD #14
415	edul351sd	0.5	2	189.0	38.0	19.6	112.6	1554.6	EDU1351SD #17
416	edul351sd	0.5	2	189.0	38.0	19.6	112.6	1554.6	EDU1351SD #18
417	edul351sd	0.5	1	189.0	38.0	19.6	112.6	1554.6	EDU1351SD #15
418	edul351sd	0.0	1	189.0	38.0	19.6			EDU1351SD #49
419	edul351sd	0.5	1	189.0	38.0	19.6	111.6	1553.6	EDU1351SD #49
420	edul351sd	0.5	1	189.0	38.0	19.6	111.6	1553.6	EDU1351SD #50
421	edul351sd	0.5	1	189.0	38.0	19.6	111.6	1553.6	EDU1351SD #51
422	edul351sd	0.0	4	204.0	15.0	8.2			EDU1351SD #19
423	edul351sd	0.5	2	204.0	15.0	8.2	51.2	1493.2	EDU1351SD #19
424	edul351sd	0.0	4	204.0	23.0	13.2			EDU1351SD #13
425	edul351sd	0.0	7	204.0	35.0	22.2			EDU1351SD #16
426	edul351sd	0.5	1	204.0	35.0	22.2	35.0	60.7	EDU1351SD #16
427	edul351sd	0.0	4	214.0	20.0	20.6			EDU1351SD #35
428	edul351sd	0.0	3	214.0	25.0	20.6			EDU1351SD #36

429	edu1351sd	0.0	1	214.0	25.0	20.6			EDU1351SD #36
430	edu1351sd	0.0	1	214.0	30.0	20.6			EDU1351SD #37
431	edu1351sd	0.5	1	214.0	30.0	20.6	101.6	1543.6	EDU1351SD #37
432	edu1351sd	0.0	2	214.0	30.0	20.6			EDU1351SD #37
433	edu1351sd	0.5	1	214.0	30.0	20.6	101.6	1543.6	EDU1351SD #37
434	edu1351sd	0.5	1	214.0	30.0	20.6	30.0	54.1	EDU1351SD #37
435	edu1351sd	1.0	1	214.0	30.0	22.6	30.0	37.2	EDU1351SD #37

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## SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

### B. DC8ASUR & DC8ASURW

- 358 dives; 10 DCS, 1 Marginal  
    *260 dry dives; 5 DCS; 1 Marginal (DC8ASUR)*  
    *98 wet dives; 5 DCS, 0 Marginal (DC8ASURW)*
- For wet dives, water temperatures ranged from 12.3° to 20° Celsius.
- Dives were conducted during the period October 1982 - February 1985
- Exercise: the workload for working wet divers described in references 1-4.

Bottom Time (min)	% max heart rate at surface	work/rest cycle
21 to 30	70%	5 min/5 min
31 to 60	65%	10 min/10 min
> 60	50%	continuous

- These datasets are included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations and dive descriptions were provided in references 1-4. Additional descriptive comments shown here were hand-written (by P.K. Weathersby) on the computer printouts from DCIEM.

1. Nishi RY, GR Lauckner, BC Eatock, JT Hewitt. Oxygen decompression techniques for compressed air diving using the XDC-2 decompression computer programmed with the Kidd-Stubbs 1971 model. DCIEM Report 84-R-19, June 1984.
2. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F). DCIEM Report 84-R-72, October 1984.
3. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series G-K) DCIEM Report 84-R-73, November 1984
4. Lauckner GR, RY Nishi, BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series L-Q). DCIEM Report 85-R-18, April 1985.

## SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

### B. DC8ASUR & DC8ASURW 358 dives; 10 DCS, 1 Marginal

Profile #	Outcome	Type	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
9	DCS	wet	29.9	127.9	<i>from printout:</i> "DCS. T <sub>2</sub> = start dec +270 min = +230 min from T <sub>0</sub> (+128 from surf)" <i>From Report:</i> "One incident occurred with surface decompression. Wet-working diver had mild Type I DCS (pain in the left knee) at 270 min following the start of decompression after a dive to 45 msw for 40 min. No bubbles were observed in the precordial region at rest, but grade 3+ bubbles were observed after movement from 92 to 197 min following the start of decompression. A few bubbles were also detected in the shoulders and in the inferior vena cava."
26	DCS	wet	-48.7	-42.7	<i>from printout:</i> "Yellow diver, pain in chest, locked out to do TT5/waiting for medical/74 mins. sending medic to 12 msw." PKW notes, "during S.I. not reported till at 12 msw O <sub>2</sub> ."
34	DCS	dry	119.9	1100.9	<i>from printout:</i> "pain right shoulder day following assume by ~ 0500 T <sub>2</sub> = 20 h" <i>From report:</i> "Finally, dry, resting subject BL had Type I DCS (pain in thumb) after a dive to 54 msw for 30 min. This may have been the result of a minor injury to his thumb during the dive. Bubbles were detected from 82 min to 175 min (peak 3/3-, right subclavian). A few bubbles were also detected in the precordial region (0/1)."
36	DCS	dry	120.0	1140.0	<i>from printout:</i> "thumb when pain onset"; "02/14/90 'onset +19 hr. right shoulder'" <i>From Report:</i> "Subject who previously incurred DCS during the standard air dives, had Type I DCS following a dive to 45 msw for 40 min. He was the team leader for this dive. No bubbles were detected in the precordial region. Grade 1 bubbles were detected in the left shoulder from 76 to 139 min after the start of decompression. His symptoms were pain in the right shoulder on the day following the dive and he was treated on a Table 6 with one extension."
42	DCS	wet	-2.5	20.0	<i>from other printout:</i> "the time onset for the DCS in DR0252A was 19 hours post dive. Subject had pain right shoulder". <i>from printout:</i> "T <sub>2</sub> = +20 min 186.5"; <i>From Report:</i> Subject experienced slight pain in both knees and the left shoulder 20 minutes after a 54 msw/45 min dive. His precordial Doppler score was 3/3 at this time. He was treated for Type I DCS on Table 5, and full relief was attained on descent to 60 fsw.
47	DCS	wet	-124.3	-118.3	<i>from printout:</i> "'slight' during S.I., recur after Sur D; T <sub>2</sub> = end S.I. = 97.6" <i>From Report:</i> Subject MD experienced a slight pain in the right elbow during the surface interval following a dive to 72 msw for 40 min as wet, working diver. This pain disappeared on recompression to the 12 msw RCC stop but recurred on completion of the decompression. He was not monitored and was treated immediately for Type I DCS on Table 6 and total relief was attained on descent to 60 fsw. He reported feeling tired prior to the dive.



49	DCS	dry	-2.5	5.0	<p><i>from printout:</i> "Subject treated Table 5 (DD2262T)"; <i>hand notes:</i> "upon surfacing ? T<sub>2</sub> = +5m T<sub>1</sub> ?"</p> <p><i>From Report:</i> Subject experienced pain in his left knee upon surfacing after a dive top 72 msw for 40 min as a dry, resting subject. He was not monitored and was treated for Type I DCS on Table 5 with total relief at 7 fsw on descent. He reported not having slept well for several days prior to this incident.</p>
50	DCS	dry	120.0	840.0	<p><i>from printout:</i> "subject treated at CUTC on Table 5 and treated again (DD2263T)"</p> <p><i>hand notes:</i> "backache at sur + 14 hr".</p> <p><i>From Report:</i> "Subject was a dry, resting diver for a dive to 72 msw for 40 minutes, and his Doppler score was minimal (0/1 in right shoulder). He developed a "backache" approximately 14 hrs post-dive but did not report this until the following morning when he also experienced numbness in both legs. He was treated for Type II DCS on Table 6, 24 hrs post-dive and reported marginal relief after 16 minutes at 60 fsw. Follow-up treatment was conducted at Toronto General Hospital (5 x Table 5). After this extensive treatment, the subject still complained of "intermittent, burning numbness" in his back. Subject was reported to have participated in a wrestling match during a party prior to the onset of the back pain."</p>
59	DCS	wet	10.0	30.0	<p><i>from printout:</i> "14 Feb 90 '30 min post dive pain left forearm near elbow"</p> <p><i>from other printout:</i> "Sur D O dive 36m/50 min wet working diver on bicycle ergometer resting for 10 minutes. He completed all decompression stops and was Dopplered post dive approx 30 min post dive he c/o pain in his left forearm near the elbow. He was treated with Table 5 but due to other dcs in the dive he ended up with a Table 6 with one extension (USAF MOD). He had complete relief after 9 minutes at 60 feet and remained asymptomatic."</p> <p><i>From Report:</i> "Subject 0137 was a wet, working diver for a 36 msw/50 min dive. Two hrs post-dive the subject reported pain in his left forearm near the elbow. His Doppler score at that time was 2/3 (precordial). He was diagnosed as having Type I DCS but was treated on Table 6 with another diver. Total relief was attained after 9 min at 60 fsw"</p>
60	DCS	dry	120.0	1440.9	<p><i>from printout:</i> "Reported 1100 day post dive"</p> <p><i>from other printout:</i> "dry resting subject completed all decompression stops as required by the profile 36m/50 min; Reported to DCIEM 1100 on day following the dive c/o pain in right leg. He was pressed at 1459 29 Jan 85 and treated on a table 6 (USAF MOD) with 2 extensions (30 and 60 ft). On surfacing he still had slight pain. He was treated again on 30 Jan 85 on a table 6 with extensions and there was no change in his symptoms. He gradually got better over the next few days. Note: he had previously injured his leg while doing strenuous leg exercises and consequently the diagnosis of DCS was questionable."</p>
61	marginal	dry	120.0	1440.9	<p><i>from printout:</i> "Report 1000 day post dive nausea &amp; visual disturbance.? anxiety no relief with Tx."</p> <p><i>from other printout:</i> "Standby diver - no work involved - sitting on a platform in water up to the waist. He reported to Medical Officer at 1000 30 Jan 85 (day following the dive). c/o nausea and vague visual disturbances. Nothing was found on examination but because of another treatment it was decided to treat his as well. It was thought that this was probably a bit of an anxiety attack because of the other cases of DCS during this dive. He was given a table 6 with extension at 60 and 30 feet. Upon surfacing from the treatment there was no improvement in his complaints."</p>

## DC8ASUR

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC8ASUR	0.0	3	59.1	30.0	32.3			DR0162A
2	DC8ASUR	0.0	4	60.0	30.0	39.5			DR0163A
3	DC8ASUR	0.0	3	59.1	30.0	39.8			DR0164A
4	DC8ASUR	0.0	4	59.1	30.1	35.7			DR0165A
5	DC8ASUR	0.0	3	88.6	60.0	40.0			DR0166A
6	DC8ASUR	0.0	3	118.1	32.0	53.3			DR0167A
7	DC8ASUR	0.0	3	88.6	60.0	36.9			DR0168A
8	DC8ASUR	0.0	3	118.1	50.0	52.9			DR0173A
9	DC8ASUR	1.0	1	147.6	40.0	62.1	132.0	230.0	DR0174A
10	DC8ASUR	0.0	2	147.6	40.0	62.1			DR0174A
11	DC8ASUR	0.0	3	177.2	30.0	65.5			DR0175A
12	DC8ASUR	0.0	3	98.4	60.0	46.1			DR0177A
13	DC8ASUR	0.0	3	177.2	30.0	65.5			DR0178A
14	DC8ASUR	0.0	3	88.6	60.0	36.7			DR0179A
15	DC8ASUR	0.0	3	118.1	50.0	51.3			DR0180A
16	DC8ASUR	0.0	3	98.4	60.0	39.3			DR0181A
17	DC8ASUR	0.0	3	147.6	40.0	62.5			DR0183A
18	DC8ASUR	0.0	3	118.1	50.0	52.2			DR0191A
19	DC8ASUR	0.0	3	88.6	60.0	36.8			DR0194A
20	DC8ASUR	0.0	6	88.6	60.0	41.5			DR0227A
21	DC8ASUR	0.0	5	118.1	50.0	54.8			DR0228A
22	DC8ASUR	0.0	4	177.2	30.1	71.1			DR0229A
23	DC8ASUR	0.0	5	147.6	40.0	63.7			DR0230A
24	DC8ASUR	0.0	5	118.1	50.0	55.1			DR0231A
25	DC8ASUR	0.0	6	88.6	60.0	39.1			DR0232A

26	DC8ASUR	1.0	1	147.6	40.0	63.2	53.6	59.6	DR0234A
27	DC8ASUR	0.0	5	147.6	40.0	63.2			DR0234A
28	DC8ASUR	0.0	5	118.1	50.0	50.4			DR0245A
29	DC8ASUR	0.0	7	88.6	60.0	153.0			DR0246A
30	DC8ASUR	0.0	5	177.2	30.0	69.5			DR0247A
31	DC8ASUR	0.0	6	147.6	40.0	67.0			DR0248A
32	DC8ASUR	0.0	6	118.1	50.0	55.3			DR0249A
33	DC8ASUR	0.0	7	88.6	60.0	39.5			DR0250A
34	DC8ASUR	1.0	1	177.2	30.0	69.1	219.0	1200.0	DR0251A
35	DC8ASUR	0.0	3	177.2	30.0	69.1			DR0251A
36	DC8ASUR	1.0	1	147.6	40.0	67.0	227.0	1247.0	DR0252A
37	DC8ASUR	0.0	4	147.6	40.0	67.0			DR0252A
38	DC8ASUR	0.0	6	177.2	45.0	123.7			DR0288A
39	DC8ASUR	0.0	5	118.1	60.0	75.0			DR0289A
40	DC8ASUR	0.0	7	147.6	67.5	141.5			DR0290A
41	DC8ASUR	0.0	5	118.1	60.0	73.5			DR0291A
42	DC8ASUR	1.0	1	177.2	45.0	121.5	164.0	186.5	DR0292A
43	DC8ASUR	0.0	4	177.2	45.0	121.5			DR0292A
44	DC8ASUR	0.0	6	206.7	30.0	97.9			DR0293A
45	DC8ASUR	0.0	6	147.6	67.0	142.3			DR0294A
46	DC8ASUR	0.0	6	206.7	30.0	93.2			DR0295A
47	DC8ASUR	1.0	1	236.2	40.0	175.9	91.6	97.6	DR0296A
48	DC8ASUR	0.0	7	236.2	40.0	175.9			DR0296A
49	DC8ASUR	1.0	1	236.2	40.0	162.0	199.5	207.0	DR0297A
50	DC8ASUR	1.0	1	236.2	40.0	162.0	322.0	1042.0	DR0297A
51	DC8ASUR	0.0	7	236.2	40.0	162.0			DR0297A
52	DC8ASUR	0.0	5	118.1	50.0	67.4			DR0319A
53	DC8ASUR	0.0	4	177.2	30.0	81.0			DR0320A
54	DC8ASUR	0.0	5	206.7	30.0	92.1			DR0323A
55	DC8ASUR	0.0	5	206.7	30.0	90.5			DR0324A

56	DC8ASUR	0.0	1	206.7	30.0	124.4	DR0324B
57	DC8ASUR	0.0	5	236.2	40.0	200.5	DR0325A
58	DC8ASUR	0.0	5	236.2	40.0	198.7	DR0326A
59	DC8ASUR	1.0	1	118.1	50.0	67.9	DR0339A
60	DC8ASUR	1.0	1	118.1	50.0	67.9	DR0339A
61	DC8ASUR	0.5	1	118.1	50.0	67.9	DR0339A
62	DC8ASUR	0.0	10	118.1	50.0	67.9	DR0339A
63	DC8ASUR	0.0	11	118.1	50.0	67.5	DR0344A
64	DC8ASUR	0.0	9	177.2	30.0	80.6	DR0348A
65	DC8ASUR	0.0	12	206.7	32.8	85.8	DR0349A
66	DC8ASUR	0.0	11	236.2	40.0	204.8	DR0350A
67	DC8ASUR	0.0	15	177.2	30.0	79.4	DR0351A
68	DC8ASUR	0.0	14	88.6	60.0	42.2	DR0353A
69	DC8ASUR	0.0	12	147.6	40.0	78.5	DR0354A
70	DC8ASUR	0.0	13	177.2	45.0	82.1	DR0359A
71	DC8ASUR	0.0	7	88.6	60.0	42.4	DR0360A
72	DC8ASUR	0.0	10	147.6	70.0	158.2	DR0365A

## DC8ASURW

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DC8ASURW	0.0	1	59.1	30.0	32.3			DR0162A
2	DC8ASURW	0.0	2	60.0	30.0	39.5			DR0163A
3	DC8ASURW	0.0	1	59.1	30.0	39.8			DR0164A
4	DC8ASURW	0.0	2	59.1	30.1	35.7			DR0165A
5	DC8ASURW	0.0	1	88.6	60.0	40.0			DR0166A
6	DC8ASURW	0.0	1	118.1	32.0	53.3			DR0167A

7	DC8ASURW	0.0	1	88.6	60.0	36.9			DRO168A
8	DC8ASURW	0.0	1	118.1	50.0	52.9			DRO173A
9	DC8ASURW	1.0	1	147.6	40.0	62.1	132.0	230.0	DRO174A
10	DC8ASURW	0.0	1	177.2	30.0	65.5			DRO175A
11	DC8ASURW	0.0	1	98.4	60.0	46.1			DRO177A
12	DC8ASURW	0.0	1	177.2	30.0	65.5			DRO178A
13	DC8ASURW	0.0	1	88.6	60.0	36.7			DRO179A
14	DC8ASURW	0.0	1	118.1	50.0	51.3			DRO180A
15	DC8ASURW	0.0	1	98.4	60.0	39.3			DRO181A
16	DC8ASURW	0.0	1	147.6	40.0	62.5			DRO183A
17	DC8ASURW	0.0	1	118.1	50.0	52.2			DRO191A
18	DC8ASURW	0.0	1	88.6	60.0	36.8			DRO194A
19	DC8ASURW	0.0	2	88.6	60.0	41.5			DRO227A
20	DC8ASURW	0.0	1	118.1	50.0	54.8			DRO228A
21	DC8ASURW	0.0	1	177.2	30.1	71.1			DRO229A
22	DC8ASURW	0.0	2	147.6	40.0	63.7			DRO230A
23	DC8ASURW	0.0	2	118.1	50.0	55.1			DRO231A
24	DC8ASURW	0.0	2	88.6	60.0	39.1			DRO232A
25	DC8ASURW	1.0	1	147.6	40.0	63.2	53.6	59.6	DRO234A
26	DC8ASURW	0.0	1	147.6	40.0	63.2			DRO234A
27	DC8ASURW	0.0	2	118.1	50.0	50.4			DRO245A
28	DC8ASURW	0.0	2	88.6	60.0	153.0			DRO246A
29	DC8ASURW	0.0	1	177.2	30.0	69.5			DRO247A
30	DC8ASURW	0.0	2	147.6	40.0	67.0			DRO248A
31	DC8ASURW	0.0	2	118.1	50.0	55.3			DRO249A
32	DC8ASURW	0.0	2	88.6	60.0	39.5			DRO250A
33	DC8ASURW	0.0	1	177.2	30.0	69.1			DRO251A
34	DC8ASURW	0.0	2	147.6	40.0	67.0			DRO252A
35	DC8ASURW	0.0	2	177.2	45.0	123.7			DRO288A
36	DC8ASURW	0.0	2	118.1	60.0	75.0			DRO289A

37	DC8ASURW	0.0	2	147.6	67.5	141.5			DRO290A
38	DC8ASURW	0.0	2	118.1	60.0	73.5			DRO291A
39	DC8ASURW	1.0	1	177.2	45.0	121.5	164.0	186.5	DRO292A
40	DC8ASURW	0.0	1	177.2	45.0	121.5			DRO292A
41	DC8ASURW	0.0	2	206.7	30.0	97.9			DRO293A
42	DC8ASURW	0.0	2	147.6	67.0	142.3			DRO294A
43	DC8ASURW	0.0	2	206.7	30.0	93.2			DRO295A
44	DC8ASURW	1.0	1	236.2	40.0	175.9	91.6	97.6	DRO296A
45	DC8ASURW	0.0	1	236.2	40.0	175.9			DRO296A
46	DC8ASURW	0.0	2	236.2	40.0	162.0			DRO297A
47	DC8ASURW	0.0	2	118.1	50.0	67.4			DRO319A
48	DC8ASURW	0.0	2	177.2	30.0	81.0			DRO320A
49	DC8ASURW	0.0	2	206.7	30.0	92.1			DRO323A
50	DC8ASURW	0.0	2	206.7	30.0	90.5			DRO324A
51	DC8ASURW	0.0	2	236.2	40.0	200.5			DRO325A
52	DC8ASURW	0.0	2	236.2	40.0	198.7			DRO326A
53	DC8ASURW	1.0	1	118.1	50.0	67.9	127.0	147.0	DRO339A
54	DC8ASURW	0.0	1	118.1	50.0	67.9			DRO339A
55	DC8ASURW	0.0	2	118.1	50.0	67.5			DRO344A
56	DC8ASURW	0.0	2	177.2	30.0	80.6			DRO348A
57	DC8ASURW	0.0	2	206.7	32.8	85.8			DRO349A
58	DC8ASURW	0.0	2	236.2	40.0	204.8			DRO350A
59	DC8ASURW	0.0	2	177.2	30.0	79.4			DRO351A
60	DC8ASURW	0.0	2	88.6	60.0	42.2			DRO353A
61	DC8ASURW	0.0	2	147.6	40.0	78.5			DRO354A
62	DC8ASURW	0.0	2	177.2	45.0	82.1			DRO359A
63	DC8ASURW	0.0	2	88.6	60.0	42.4			DRO360A

## SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

### C. DCSUREP & DCSUREPW

- 69 dives; 1 DCS, 0 Marginal  
    *52 dry dives; 0 DCS, 0 Marginal (DCSUREP)*  
    *17 wet dives; 1 DCS, 0 Marginal (DCSUREPW)*
- For wet dives, water temperatures ranged from 12.3° to 20° Celsius.
- Dives were conducted during the period February 1984 - February 1985
- Exercise: the workload for working wet divers described in references 1-4.

Bottom Time (min)	% max heart rate at surface	work/rest cycle
21 to 30	70%	5 min/5 min
31 to 60	65%	10 min/10 min
> 60	50%	continuous

- This dataset is included in the report, Statistically Based Decompression Tables VII.
- Descriptions of the DCS manifestations and dive descriptions were provided in references 1-3. Additional descriptive comments shown here were hand-written (by P.K. Weathersby) on the computer printouts from DCIEM.

1. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series A-F). DCIEM Report 84-R-72, October 1984.
2. Lauckner GR, RY Nishi and BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series G-K) DCIEM Report 84-R-73, November 1984
3. Lauckner GR, RY Nishi, BC Eatock. Evaluation of the DCIEM 1983 decompression model for compressed air diving (Series L-Q). DCIEM Report 85-R-18, April 1985.

## SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

### C. DCSUREP & DCSUREPW

69 dives; 1 DCS, 0 Marginal

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
9	-271.3	-265.7	Subject 0136 was a wet, working diver for the repetitive combination of 54 msw/30 min decompressed with SurD O <sub>2</sub> followed after 3 hrs by a 18 msw/30 min dive decompressed with Standard Air. He reported a slight pain in his right shoulder during the Surface Interval prior to the RCC O <sub>2</sub> stop (SurD O <sub>2</sub> ). On reaching the 12 msw RCC stop, the pain was relieved and he successfully completed the decompression. During the Surface Interval between dives, his maximum Doppler score was 3/-3 in the right shoulder. After completing the second dive, he was totally asymptomatic. His maximum Doppler score was 3-/3 (precordial) and 3-/2 (right shoulder). Six hours post-dive, subject 0136 reported severe pain in the right shoulder and elbow. He was treated on Table 6 with pain reduced significantly after 60 min and complete relief on ascent to 30 fsw. (Report 85-R-18 pg. 13).

### DCSUREP

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DCSUREP	0.0	8	147.6	221.0	46.1			DR0283R
2	DCSUREP	0.0	10	147.6	220.0	47.5			DR0287R
3	DCSUREP	0.0	3	147.6	208.0	34.0			DR0322R
4	DCSUREP	0.0	5	147.6	209.0	34.2			DR0328R
5	DCSUREP	0.0	6	147.6	208.0	35.2			DR0330R
6	DCSUREP	0.0	5	147.6	227.0	59.3			DR0332R
7	DCSUREP	0.0	6	147.6	230.0	60.7			DR0334R
8	DCSUREP	0.0	13	177.2	30.0	291.9			DR0358R
9	DCSUREP	1.0	1	177.2	30.0	290.3	49.0	54.6	DR0362R
10	DCSUREP	0.0	12	177.2	30.0	290.3			DR0362R



## DCSUREPW

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	DCSUREPW	0.0	2	147.6	221.0	46.1			DRO283A
2	DCSUREPW	0.0	2	147.6	220.0	47.5			DRO287A
3	DCSUREPW	0.0	1	147.6	208.0	34.0			DRO322A
4	DCSUREPW	0.0	2	147.6	209.0	34.2			DRO328A
5	DCSUREPW	0.0	2	147.6	208.0	35.2			DRO330A
6	DCSUREPW	0.0	2	147.6	227.0	59.3			DRO332A
7	DCSUREPW	0.0	2	147.6	230.0	60.7			DRO334A
8	DCSUREPW	0.0	2	177.2	30.0	291.9			DRO358A
9	DCSUREPW	1.0	1	177.2	30.0	290.3	49.0	54.6	DRO362A
10	DCSUREPW	0.0	1	177.2	30.0	290.3			DRO362A

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<b>SECTION IX: SURFACE DECOMPRESSION (OXYGEN)</b>
<b>D. NMROSUR90</b>
<ul style="list-style-type: none"><li>• 45 dives; 1 DCS, 0 Marginal</li><li>• Dives were wet, but water temperatures were not recorded in the log.</li><li>• Dives were conducted during the period July 1990</li><li>• Exercise: the log records an exercise regimen of 10 minutes work, 10 minutes rest while on bottom. However, no description of the work performed was located.</li><li>• Manifestation description was taken directly from the archived medical records.</li></ul>
<ol style="list-style-type: none"><li>1. No report was published from this dive series.</li></ol>

# SECTION IX: SURFACE DECOMPRESSION (OXYGEN)

## D. NMROSUR90 45 dives; 1 DCS, 0 Marginal

Profile #	T <sub>1</sub>	T <sub>2</sub>	Signs & Symptoms
16	10	50	Surfaced from 120/50 Sur-D O <sub>2</sub> dive at 1400. Dive uneventful apart from light helmet which cause him to use left arm to hold helmet on shoulders. This gave him some discomfort over the left shoulder during the dive which was unchanged during decompression and still there on surfacing. Felt even on surfacing and remained so until 1450 when his left forearm and hand began to feel subjectively cold. Examined at 1455 when he had hyposthesia of the left forearm and hand on clinical examination. Both sensation to pin prick and light touch diminished with a sharp upper margin just below the elbow and with a "glove" type distribution. No other CNS disturbance elicited on full examination. Put on O <sub>2</sub> and recompressed at 1518. In the last few minutes before recompression, cold sensation began to extend up arm. Had full relief within 10 min at 60 fsw. Treated on TT6 with a single 60 min extension at 30 fsw (this necessary because of the concurrent treatment of another diver). Remained well and OK of TT6, felt well. Absolutely normal.

Profile #	Data Set Name	Outcome	# of Divers	Depth	Bottom Time	Ascent Time	T <sub>1</sub>	T <sub>2</sub>	Data Set Notations
1	nmrosur90	0.0	3	60.0	179.1	52.3			surd301 05-JUL-90
2	nmrosur90	0.0	3	60.0	179.2	52.6			surd302 06-JUL-90
3	nmrosur90	0.0	3	60.0	179.1	52.7			surd303 09-JUL-90
4	nmrosur90	0.0	3	60.0	179.2	52.8			surd304 10-JUL-90
5	nmrosur90	0.0	3	60.0	179.1	52.3			surd305 11-JUL-90
6	nmrosur90	0.0	3	60.0	177.2	52.3			surd306 12-JUL-90
7	nmrosur90	0.0	3	120.0	49.1	49.7			surd401 16-JUL-90
8	nmrosur90	0.0	3	120.0	49.1	49.6			surd402 17-JUL-90
9	nmrosur90	0.0	3	120.0	49.1	49.8			surd403 18-JUL-90
10	nmrosur90	0.0	3	120.0	49.1	49.1			surd404 19-JUL-90
11	nmrosur90	0.0	3	120.0	49.1	49.6			surd405 19-JUL-90
12	nmrosur90	0.0	3	120.0	49.2	49.6			surd406 24-JUL-90
13	nmrosur90	0.0	3	120.0	49.1	49.6			surd407 24-JUL-90
14	nmrosur90	0.0	3	120.0	49.1	49.4			surd408 26-JUL-90
15	nmrosur90	0.0	2	120.0	49.0	49.4			surd409 26-JUL-90
16	nmrosur90	1.0	1	120.0	49.0	49.4	108.4	148.4	surd409 26-JUL-90